PHASE II GROUNDWATER INVESTIGATION REPORT

HIMCO SITE
ELKHART, INDIANA

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TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF FIGURES
(Following Text)

LIST OF FIGURES
(Following Text)

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to present the results of the Phase II Groundwater Investigation completed by Conestoga-Rovers & Associates (CRA), on behalf of the Performing Settling Defendants (PSDs) at the Himco Site, located in Elkhart, Indiana.

The Himco Site is a National Priorities List (NPL) site that is being remediated pursuant to a Consent Decree (Civil Action No. 2:07cv304 (TS)) (CD). The Statement of Work (SOW), included as Appendix B of the CD, specified the Remedial Action requirements for the Site. The SOW requires groundwater investigations to the east and southeast of the Himco Site and the implementation of a Groundwater Monitoring Program. CRA, on behalf of the PSDs, prepared a Remedial Design Work Plan that combined the East and Southeast Groundwater Investigations and the Groundwater Monitoring Program into a three-Phase Groundwater Investigation that builds incrementally to address the groundwater investigation and monitoring requirements of the SOW.

CRA completed the Phase I Groundwater Investigation in 2008 and 2009. The Phase I Groundwater Investigation consisted of:

- Historic data compilation
- Existing monitoring well reconnaissance and survey
- Baseline groundwater monitoring
- Phase I vertical aquifer sampling (VAS)
- The Interim Groundwater Monitoring Program

CRA submitted the Phase I Groundwater Investigation Report to the United States Environmental Protection Agency (USEPA) in May 2009. The Phase I Groundwater Investigation included recommendations for the scope of the Phase II Groundwater Investigation. USEPA provided comments on the Phase I Groundwater Investigation Report in a letter dated August 12, 2009. CRA responded to these comments in a letter dated October 20, 2009 and USEPA approved the recommendations for the Phase II Groundwater Investigation in a letter dated December 23, 2009.

The Himco Site Trust implemented the Phase II Groundwater Investigation in 2010.

1.2 BACKGROUND

The Site is a closed, unlicensed landfill located at the intersection of County Road 10 and the John Weaver Parkway (formerly Nappanee Street Extension) in Cleveland Township, Elkhart County, Indiana. The Site is approximately 60 acres in size, and accepted waste such as household refuse, construction rubble, medical waste, and calcium sulfate between 1960 and 1976. The landfill was closed in 1976.

Figure 1.1 shows the Site location. Figure 1.2 shows the layout of the Site, including property boundaries.

The Site consists of two major areas: the landfill, which is covered with calcium sulfate and a layer of sand, and the 4-acre construction debris area (CDA), located on the northern portion of seven residential properties and one commercial property that front onto County Road 10.

The Site was proposed for the NPL in 1988 and was placed on the NPL in 1990. The Remedial Design/Remedial Action (RD/RA) is being conducted pursuant to the CD, which became effective on November 27, 2007. The lead Agency for the Site is the USEPA Region 5. The Indiana Department of Environmental Management (IDEM) is the support Agency.

Section II, Paragraph 4.3 of the SOW describes the requirements for the groundwater investigation east and southeast of the Site. The purpose of the investigation is to delineate the contaminant plume emanating from the Site that may potentially be impacting the adjacent aquifer and water supply wells. The East and Southeast Groundwater Investigation and the Groundwater Monitoring Program were combined. Information regarding groundwater quality and groundwater flow directions from both areas is useful for interpreting local hydrogeologic conditions.

Section II, Paragraph 5 of the SOW describes the requirements for the Groundwater Monitoring Program intended to characterize the nature and extent of groundwater contamination beneath the Site. A network of 39 monitoring wells was described in the Supplemental Site Investigation/Site Characterization Report (USEPA, 2002) (SSI).

Section II, Paragraph 5.1 of the SOW states that the PSDs will submit a groundwater monitoring plan as part of the RD Work Plan, which will address the frequency of sampling, the wells to be sampled, and laboratory analyses to be performed. The SOW also requires that the wells be segregated into wells for detection monitoring and wells for compliance monitoring. Paragraph 5.1.4 further states that all groundwater wells

associated with the Site shall be monitored for 10 years, but that an alternate schedule may be used if approved by USEPA.

CRA used VAS techniques during the Phase I Groundwater Investigation to characterize the variations in contaminant distribution with depth in the thick sand aquifer sequence underlying the Site. CRA used VAS at the Site to address this data gap and to ensure that any new monitoring wells are installed to the appropriate depths.

CRA will complete the groundwater investigation at the Site in phases based on the portion of the Site under investigation and the target depths of the investigation. A phased approach permits information collected during the initial stages of the investigation to guide subsequent phases of the investigation. The Phase I Groundwater Investigation included VAS at selected monitoring well locations to investigate the horizontal and vertical extent of groundwater contamination to a depth of approximately 150 feet below ground surface. CRA collected hydraulic monitoring data during the Phase I Groundwater Investigation to evaluate the groundwater flow regime in the vicinity of the Site and to guide future plume delineation. CRA completed groundwater sampling of the existing wells to characterize groundwater quality beneath the Site.

The objectives of the groundwater investigations are to:

i) Delineate the horizontal and vertical extent of groundwater impact from the landfill around the perimeter of the landfill

ii) Delineate 1,2-dichloropropane detected in a sample from the residential well at 54305 Westwood Drive, immediately east of the Site

iii) Delineate an appropriate buffer zone east of the Site

iv) Delineate groundwater contaminants that may have migrated south of the Site

v) Provide information required to design an appropriate monitoring well network

The Phase I Groundwater Investigation was the first stage of data collection and analysis and consisted of the following tasks:

- Historic data compilation
- Monitoring well reconnaissance and survey
- Baseline groundwater sampling
- VAS

The Phase II Groundwater consisted of the following tasks:

- Additional VAS
- New monitoring well installation

The Phase I Groundwater Investigation VAS focused on the southern and eastern edges of the landfill and downgradient areas to the south, southeast and east, and was limited to 150 feet in depth. Monitoring wells were installed at the Phase I VAS locations during the Phase II Groundwater Investigation. The VAS portion of the Phase II Groundwater Investigation focused on the southeast corner of the Site and downgradient to the southeast. The target depth of some of the Phase II VAS boreholes was Bedrock, to investigate hydrogeologic conditions beneath the bottom depth of the Phase I VAS. The results of the Phase II Groundwater Investigation further refined the horizontal and vertical delineation of any plumes emanating from the Site, refined the definition of background groundwater quality, and defined appropriate locations and depths for sentry monitoring wells.

CRA completes quarterly groundwater monitoring at the Site on behalf of the PSDs. The Himco Annual Groundwater Monitoring Report (CRA, 2010) included groundwater monitoring data collected between April 2009 and February 2010. This Phase II Groundwater Investigation report includes data collected during the routine quarterly groundwater monitoring completed in June 2010. At the completion of two years of quarterly groundwater monitoring, CRA will evaluate the scope and frequency of routine groundwater monitoring at the Site and will rationalize the groundwater monitoring program.

CRA collected vertical aquifer samples using the SimulProbe® groundwater sampling tool, which collects a grab sample of groundwater directly from the aquifer. This approach differs from the low flow groundwater samples collected from the monitoring wells during routine groundwater quality monitoring. The most significant difference is that the low flow groundwater sampling minimizes sample turbidity, while the SimulProbe® samples are typically turbid. Sample turbidity may bias metals results high. CRA compared the analytical results for groundwater samples collected from the Phase II monitoring wells to the analytical results for corresponding Phase I VAS groundwater samples to evaluate this potential bias.

CRA has uploaded the database into an in-house software tool called e:DAT (electronic data access tool). The e:DAT for this Site can also be used to access aerial imagery,

stratigraphic logs and relevant well construction diagrams. Appendix A includes a copy of the e:DAT.

1.3 REPORT ORGANIZATION

This report includes the following sections:

- Section 2.0 describes the Phase II Groundwater Investigation activities and routine groundwater monitoring activities completed at the Site
- Section 3.0 provides an updated discussion of Site hydrogeologic conditions beneath the Site based on the results of the Phase II Groundwater Investigation and discusses the results of the groundwater elevation monitoring
- Section 4.0 discusses groundwater quality data collected in June 2010
- Section 5.0 compares the groundwater quality sample results from the Phase II monitoring wells to the corresponding Phase I VAS groundwater screening data
- Section 6.0 discusses the results of the Phase II VAS
- Section 7.0 presents a summary of the data gap analysis and the proposed scope of work for the Phase III Groundwater Investigation
- Section 8.0 presents references cited in this report

2.0 INVESTIGATIVE ACTIVITIES

2.1 INTRODUCTION

This section describes the scope of groundwater monitoring activities completed at the Site during the Phase II Groundwater Investigation.

2.2 GROUNDWATER ELEVATION MONITORING

CRA completed the initial round of groundwater elevation monitoring on October 27, 2008. CRA inventoried the existing monitoring well network prior to the water level round and Table 2.1 is a summary of the status of the existing and the Phase II monitoring wells in the vicinity of the Site.

CRA has completed quarterly groundwater elevation monitoring rounds since October 2008. Data collected between the first quarter (Q1) and sixth quarter (Q6) were discussed in previous reports. Section 3.0 provides the results of the groundwater elevation monitoring completed on June 14, 2010 as part of the seventh quarterly (Q7) monitoring round.

2.3 GROUNDWATER QUALITY MONITORING

CRA completed a Baseline Groundwater Sampling round from October 28, 2008 through November 6, 2008 and on November 18 and 19, 2008. The purpose of this sampling was to determine if the wells are capable of providing representative groundwater samples and to establish baseline groundwater quality conditions. Baseline Groundwater Sampling round represents the first routine quarterly groundwater quality monitoring round (Q1).

CRA completed the initial round of the Interim Groundwater Monitoring Program in February 2009. The following are the dates of the Interim Groundwater Monitoring Program sampling events CRA has completed at the Site to date:

- Interim Monitoring Groundwater Program (Q2) - February 9 to February 19, 2009
- Interim Monitoring Groundwater Program (Q3) - April 29 to May 6, 2009
- Interim Monitoring Groundwater Program (Q4) - August 4 to August 18, 2009
- Interim Monitoring Groundwater Program (Q5) - November 3 to November 11, 2009

- Interim Monitoring Groundwater Program (Q6) - February 23 to March 4, 2010
- Interim Monitoring Groundwater Program (Q7) – June 15 to June 24, 2010

The primary goal of the Interim Groundwater Monitoring Program is to characterize the nature and extent of groundwater contamination beneath the Site. The Interim Groundwater Monitoring Program will be completed on a quarterly basis for two years. The results of the Interim Groundwater Monitoring Program will be provided to the USEPA after two years (eight quarterly events) are completed, at which time the scope and frequency of any further groundwater monitoring will be proposed.

Table 2.2 lists the monitoring wells included in the Interim Groundwater Monitoring Program. The WTJ monitoring well nest (shown on Figure 1.2) was included in the Baseline Groundwater Sampling round and the Q2 (February 2009) through the Q6 2009 (November 2009) Interim Groundwater Monitoring Program, until USEPA agreed that it was appropriate to discontinue groundwater quality monitoring at this location. As noted on Table 2.2, the Trust did not have access to the background monitoring wells (WT102A, WT102B, and WT102C) and four of the monitoring wells along the northern Site boundary (WT112A, WT112B, WT113A, and WT113B) in June 2010. As USEPA is aware, the property owner (D&J Realty) denied the PSDs access to these wells as of June 2010.

As additional monitoring wells are installed in the course of groundwater investigations they are incorporated into the Interim Groundwater Monitoring Program. The monitoring wells installed during the Phase II Groundwater Investigation were included in the Q7 June 2010 round of the Interim Groundwater Monitoring Program.

Table 2.3 provides the parameter list for the Interim Groundwater Monitoring Program. The parameter list includes Target Compound List (TCL) semi-volatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), Target Analyte List (TAL) metals and selected general chemistry parameters. TestAmerica Laboratories Inc. of North Canton, Ohio analyzed the groundwater samples. Analytical results are compiled in Appendix B. Laboratory reports and data validation memoranda are provided in Appendix C. CRA validated the groundwater analytical data in accordance with the Quality Assurance Project Plan (QAPP) included in the Remedial Design Work Plan (CRA, 2008). Appendix D provides the stabilization parameters measured during groundwater sampling.

2.4 MONITORING WELL INSTALLATION

Figure 2.1 shows the locations of the monitoring wells installed during the Phase II Groundwater Investigation. Stearns Drilling Company (Stearns) of Dutton, Michigan, provided drilling services.

CRA based the design of the Phase II monitoring wells on the Phase I VAS results, and installed the wells in accordance with the recommendations provided in the Phase I Groundwater Investigation report (CRA, 2009). Stearns installed the Phase II monitoring wells using the hollow stem auger (HSA) drilling method and following the procedures provided in Section 2.3.2.1 of the Field Sampling Plan (FSP) (CRA, October 2008). Stearns also completed the well development in accordance with the FSP (CRA, October 2008) procedures. CRA surveyed the Phase II monitoring wells in accordance with Section 2.1.1 of the FSP (CRA, 2008). Stearns installed the Phase II monitoring wells between May 3, 2010 and May 12, 2010.

Appendix E provides stratigraphic and instrumentation logs for the Phase II monitoring wells.

During the Phase II Investigation, CRA deviated from the recommendations provided in the Phase I Groundwater Investigation report (CRA, 2009) with respect to the depth of the well screen installed for monitoring well WTO3. Intermediate Aquifer monitoring well WTO3 is located midway along the eastern Site boundary. The Phase I Groundwater Investigation Report (CRA, 2009) included the following discussion of the groundwater quality screening data collected at VAS-150:

> *A second new monitoring well is warranted at peak arsenic, lead, iron and manganese concentrations in groundwater samples collected at 673 ft AMSL in the Intermediate Aquifer. However, the interval from 660 ft AMSL to 677 ft AMSL is composed of interbedded silt and clay and is not likely a significant contaminant migration pathway. The proposed Intermediate Aquifer monitoring well should be screened from 678 ft AMSL to 683 ft AMSL, above the interbedded silt and clay.*

When the well was installed, CRA inadvertently set the mid-point of the well screen at the depth of the VAS sample collected from the silt layer (which is the standard approach in the FSP), rather than the proposed, slightly higher elevation corresponding to the overlying sand. However, after CRA developed the well and collected groundwater samples from WTO3 in June 2010, the final turbidity of the groundwater sample was 4.34 NTU, which is below the recommended maximum turbidity of 5 NTU.

Intermediate Aquifer monitoring well WTO3 is therefore capable of producing representative groundwater samples, and the samples collected will be from the interval identified in the Phase I Groundwater Investigation. Sections 4.0 and 5.0 discuss the results of groundwater samples collected from WTO3.

CRA installed Phase I VAS105 to investigate groundwater quality in the Intermediate Aquifer and delineate groundwater contaminants that may have migrated south of the Site. Subsequently, the property owner denied the PSDs access to his property to install permanent monitoring wells. He agreed to allow permanent monitoring wells on his property if they were located in the right-of-way for County Road 10. Figure 2.1 provides the location of proposed monitoring well nest WT122. In its June 24, 2010 approval of the revised well locations, USEPA requested that CRA evaluate the elevation of the proposed monitoring wells against the groundwater screening data collected from Phase II borehole VAS115. CRA provided this evaluation to USEPA in an email dated August 11, 2010. Similar peak concentrations of metals observed in groundwater samples collected from VAS105 across the Intermediate Aquifer are not present in groundwater samples collected from VAS115. Two new Intermediate Aquifer wells, WT122B and WT122C, will be installed at the location north of WT105 at the depths corresponding to the primary and secondary metals peaks in groundwater samples collected at 659 ft AMSL at 699 ft AMSL. As noted in our May 13, 2010 email correspondence to USEPA, the property owner (Mr. A. Craft) also required, as a condition of access, that the PSDs abandon well WT105A, and limit any replacement well to a location within the right-of-way for County Road 10. As summarized in CRA's May 13, 2010 email correspondence, replacing WT105A with a new well, WT122A, at the location shown on Figure 2.1, does not diminish our ability to monitor shallow groundwater quality and movement south and downgradient of the Site.

As of October 2010, Mr. A. Craft had not yet provided access to his property to complete the WT122 well nest installation.

2.5 VERTICAL AQUIFER SAMPLING

Figure 2.1 shows the locations of the VAS boreholes installed during the Phase II Groundwater Investigation. Stearns provided drilling services. VAS boreholes and groundwater sampling were completed using a rotosonic drill rig and the SimulProbe® groundwater sampler. CRA followed the procedures for groundwater sampling described in Section 2.3 of the FSP (CRA, 2008). Stearns installed the Phase II VAS boreholes between May 18, 2010 and June 1, 2010.

The VAS groundwater samples were collected at 10 foot intervals and analyzed for the screening parameters listed in Table 2.4, including TCL VOCs, TAL metals, and selected general chemistry parameters. TestAmerica Laboratories Inc., North Canton, Ohio, analyzed groundwater samples.

Stratigraphic and instrumentation logs for the Phase I VAS boreholes are provided in Appendix E.

During the installation of VAS106-225 and VAS121-225, CRA did not collect a groundwater sample required by the work plan from a ten-foot sample interval when fine-grained soils (sandy silt, silty clay, and clay) were encountered at each of the locations. Initially, CRA attempted to collect groundwater samples from this material, however, the fine-grained soils failed to provide sufficient recharge for groundwater sample collection. CRA maintained the ten-foot groundwater sample interval in boreholes VAS101-225 and VAS115-175, and during the remainder of the boreholes at VAS106-225 and VAS121-225.

3.0 REGIONAL AND SITE GEOLOGY AND HYDROGEOLOGY

3.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

Elkhart County is located in the St. Joseph River Basin. A thick sequence of glacial outwash deposits, ranging from 85 to 500 feet, overlies the bedrock. In the vicinity of the Site, these overburden deposits consist primarily of outwash sands and gravels that contain both minor lenses of silt and clay and a regionally significant clay/silt dominated interval of variable thickness. The regional geologic units and the corresponding hydrogeologic units are, in descending order:

- The upper sand and gravel - the Regional Upper Aquifer
- The regional silt/clay layer - the Regional Semi-Confining Layer
- The lower sand and gravel - the Regional Lower Aquifer
- The unnamed clay layer - the Unnamed Clay Layer
- The bedrock - the Bedrock

Figure 3.1 provides a schematic cross section of the regional geologic and hydrogeologic units.

The upper sand and gravel corresponds to the Regional Upper Aquifer. It thickens to the south across Elkhart County. It is typically 50 feet thick and ranges up to 150 feet thick. Thin deposits of silt and clay are also present within the Regional Upper Aquifer.

The regional silt/clay layer forms a Regional Semi-Confining Layer that typically underlies the Upper Aquifer. It is a silt/clay dominated sequence with interbedded sands and gravel (Arihood, L.D. and Cohen, D.A., 1997). The Regional Semi-Confining Layer is not present beneath the Site, but south of the Site, it attains a maximum thickness of 175 feet.

The lower sand and gravel corresponds to the Regional Lower Aquifer and lies beneath the Regional Semi-Confining Layer. The Regional Lower Aquifer is composed of interbedded sand and gravel.

Another clay layer is present south of the Site from an elevation of 590 feet Above Mean Sea Level (AMSL) to 620 feet AMSL. As illustrated on Figure 3.1, south of the Site this "unnamed" clay layer lies directly on the bedrock and forms the base of the Lower Aquifer. This unnamed clay appears to be discontinuous beneath the Site because it is

encountered in deep wells located along the southern Site boundary but not along the northern Site Boundary.

The bedrock beneath northwest Elkhart County is the Devonian and Mississippian aged Ellsworth Shale. The Ellsworth Shale consists predominately of greenish-gray shale alternating with light greenish limestone and dolomite. The Bedrock is not a significant source of groundwater. The typical elevation of the bedrock surface in northeast Elkhart County is highly variable but is typically between 550 and 600 feet AMSL. A bedrock valley has been delineated beneath the western portion of the Site. This north-south trending bedrock valley is incised to 350 feet AMSL.

The depth to water in the region of the Site varies from 8 to 17 feet (Duwelius and Silcox, 1991). Overburden groundwater in the area flows south towards the St. Joseph River, which is the regional discharge for this area. An average regional horizontal hydraulic gradient of 1.5×10^{-3} feet/feet was reported for the Elkhart area (Duwelius and Silcox, 1991). Vertical hydraulic gradients are small in areas away from the river.

Typical hydraulic conductivity calculated from pumping tests conducted in the vicinity of the Site ranges from 50 feet per day (feet/day) to 200 feet/day. Some of the large water supply wells in the area are capable of yielding in excess of 2,000 gallons per minute (gpm). The hydraulic conductivity in the vicinity of these wells is typically 500 to 1,500 feet/day. The lower end of this range of values is typical of clean sand and the higher end of the range is typical of gravel deposits. Duwelius and Silcox (1991) estimated the regional groundwater velocity was 1.1 to 1.7 feet/day.

Several municipal well fields serving the City of Elkhart are located near the Site. The closest is the North Main St. Well field located approximately 1.5 miles east-southeast of the Site. CRA searched the Indiana Department of Natural Resources Water Well Record Database as part of the Phase I Groundwater Investigation (CRA, 2009). As of 2009, these records indicate 26 wells with a capacity greater than 70 gpm are present with in 0.9 miles of the Site, mostly to the southeast. These wells have the potential to influence groundwater elevations and flow directions in the vicinity of the Site.

3.2 SITE GEOLOGY AND HYDROGEOLOGY

3.2.1 INTRODUCTION

There are five principal stratigraphic units beneath the Site. They and the corresponding hydrostratigraphic units are, in descending order:

- The upper sand and gravel - the Upper Aquifer (710 feet AMSL to 760 feet AMSL)
- The intermediate sand and gravel - Intermediate Aquifer (610 feet AMSL to 710 feet AMSL)
- The Unnamed Silt/Clay Layer (590 feet AMSL to 610 feet AMSL)
- The lower sand and gravel – the Lower Aquifer (270 feet AMSL to 590 feet AMSL)
- The bedrock – the Bedrock

The depth to groundwater in the vicinity of the Site is relatively shallow, typically ranging from 5 to 15 feet below ground surface. The elevation of groundwater in the vicinity of the Site ranges from 752 to 760 feet AMSL. Section 3.2.6 provides the results of the June 2010 quarterly groundwater elevation monitoring round.

Figure 3.1 illustrates the differences between the typical regional hydrostratigraphic sequence and conditions beneath the Site. The geology and hydrogeology beneath the Site differs from the regional geology and hydrogeology because:

- The Regional Semi-Confining Layer is not present beneath the Site
- The regional Upper and Lower Aquifers coalesce on Site (and are called the Upper and Intermediate Aquifers, respectively)
- There is an additional sand aquifer on Site that underlies the Unnamed Silt/Clay (called the Lower Aquifer)
- Beneath the western portion of the Site there is a bedrock valley so that the overburden sequence is in excess of 450 feet thick as opposed to the typical 200 to 250 feet thick regional overburden sequence

CRA revised the Site-specific geologic and hydrogeologic stratigraphy for the Site based on a review of the historic data and the results of the Phase I Groundwater Investigation (CRA, 2009). The principal data gaps identified in the hydrogeologic characterization in the Phase I Groundwater Investigation report (CRA, 2009) were as follows:

- CRA has identified a silt /clay layer, herein call the -Unnamed Silt/Clay Layer- that may be continuous beneath the Site. Additional investigative activities are required to confirm the thickness and lateral extent of the Unnamed Silt/Clay Layer.
- There is a lack of high quality stratigraphic information from the deeper strata at the Site and in particular the Unnamed Silt/Clay Layer and the Lower Aquifer.

The gray silty clay of the Unnamed Silt/Clay Layer was encountered at an elevation of 610 ft AMSL to 620 ft AMSL in several of the Phase I VAS boreholes. This clay layer was not observed during previous investigations at the Site. Phase II VAS boreholes VAS101-225, VAS106-225, and VAS121-225 penetrated the Unnamed Silt/Clay Layer. Phase II VAS boreholes VAS101-225, VAS106-225, and VAS121-225 extended through the rest of the overburden sequence and terminated in bedrock providing stratigraphic information regarding the Unnamed Silt/Clay Layer and the Lower Aquifer previously identified as a data gap.

CRA used the stratigraphic data from these boreholes, and information contained on stratigraphic logs from previous investigations, to construct a series of cross sections in the vicinity of the Site. Figures 3.2 through 3.8 provide these cross sections and a cross section location map. The following section describes the stratigraphic information provided by the Phase II VAS boreholes with respect to the data gaps cited above.

3.2.2 UPPER AND INTERMEDIATE AQUIFERS

CRA conceptualizes the Upper and Intermediate Aquifers beneath the Site as one aquifer with aquitard materials occasionally interspersed. The Intermediate Aquifer is generally finer-grained than the overlying Upper Aquifer and it contains discontinuous zones of silt and clay. The Intermediate Aquifer beneath the Site occupies the same interval as the regional Semi-Confining Layer and the regional Lower Aquifer, which both terminate at 610 feet AMSL. Phase II VAS borehole VAS115-175 provided new stratigraphic information on the Upper and Intermediate Aquifer in the vicinity of the Site.

Figure 3.4 (Cross Section B-B') shows the stratigraphy along the southern portion of the Site and includes Phase II VAS borehole VAS115-175. The Upper and Intermediate Aquifers are present as a single continuous sand layer at VAS115-175. The sand is uniformly graded, varies from fine to coarse grained and from light brown to grey. This contrasts with other locations where silt or clay lenses are present in the Upper and Intermediate Aquifers. At VAS115-175, the base of the Intermediate Aquifer is at 597 ft AMSL and overlies gray silty clay.

Figure 3.8 (Cross Section G-G') shows the stratigraphy east of the Site and includes Phase II VAS borehole VAS121-225. The Upper and Intermediate Aquifers are composed of brown uniformly graded fine to coarse sand. Layers of silty clay, clay and gravel are present at this location, but they are not laterally continuous and are not present in adjacent boreholes. The base of the Intermediate Aquifer is at 614 ft AMSL and overlies gray silt/clay. The Upper and Intermediate Aquifer sequence at the location of Phase II VAS121-225 is similar to the sequence at the Phase I VAS boreholes.

3.2.3 UNNAMED SILT/CLAY LAYER

As described in the Phase I Groundwater Investigation report (CRA, 2009), many of the Phase I VAS boreholes terminated in a gray clayey silt or silty clay CRA called the Unnamed Silt/Clay Layer. Phase II VAS boreholes VAS101-225, VAS106-225, and VAS121-225 penetrated the Unnamed Silt/Clay Layer.

Figure 3.5 (Cross Section C-C') shows the stratigraphy south and southeast of the Site and includes Phase II VAS boreholes VAS106-225 and VAS121-225. The Unnamed Silt/Clay Layer in the vicinity of VAS106-225 consists of 45-foot thick sequence of grey silt, clayey silt and silty clay that extends from 612 ft AMSL to 567 ft AMSL. A seven-foot thick layer of a brown sand/silt mixture occurs within the Unnamed Silt Clay Layer in the vicinity of VAS106-225. The Unnamed Silt/Clay Layer in the vicinity of VAS121-225 consists of a 40-foot thick sequence of gray silt and clay that extends from 614 ft AMSL to 574 ft AMSL. The Unnamed Silt/Clay Layer is continuous between the locations of VAS106-225 and VAS121-225.

Figure 3.4 (Cross Section B-B') shows the stratigraphy along the southern portion of the Site and includes Phase II VAS boreholes VAS101-225 and VAS115-175. In the vicinity of VAS101-225 the top of the Unnamed Silt/Clay Layer is present at 612 ft AMSL versus 597 ft AMSL at VAS115-175. VAS115-175 terminated in a gravel layer at 587 ft AMSL and did not penetrate to the typical elevation of the base of the Unnamed Silt/Clay Layer. The Unnamed Silt/Clay Layer at VAS101-225 includes a five-foot thick layer of

grey silty clay and clayey silt underlain by four feet of poorly graded fine sand with silt and four feet of brown silt and clay.

The Unnamed Silt/Clay Layer is continuous beneath the southeast corner of the Site and southeast of the Site at the Phase II VAS borehole locations.

3.2.4 LOWER AQUIFER

Phase II boreholes VAS101-225, VAS106-225, and VAS121-225 penetrated the entire thickness of the Lower Aquifer.

Figure 3.4 (Cross Section B-B') shows the stratigraphy along the southern portion of the Site and includes Phase II VAS borehole VAS101-225. The top of Lower Aquifer in the vicinity of VAS101-225 is at 576 ft AMSL. Here, the Lower Aquifer consists of a twelve-foot thick layer of brown fine sand separated from a seven-foot thick gravel layer by a sixteen-foot thick layer of gray silt.

Figure 3.5 (Cross Section C-C') shows the stratigraphy south and southeast of the Site and includes Phase II VAS boreholes VAS106-225 and VAS121-225. The top of Lower Aquifer occurs at 567 ft AMSL in VAS106-225 and consists of 19 ft of brown fine sand overlying 22 ft of grey silt. The Lower Aquifer in the vicinity of VAS121-225 consists of 21 ft of brown fine sand that overlies grey sandy silt.

The Lower Aquifer underlies the Unnamed Silt/Clay Layer beneath the southeast corner of the Site and south east of the Site at the Phase II VAS borehole locations. It occupies the interval between approximately 570 ft AMSL and 540 ft AMSL and consists primarily of fine brown sand. It is underlain by with thick grey silt or clay layers, which in turn overlies bedrock.

3.2.5 BEDROCK

Blue green friable shale underlies the overburden sequence at Phase II VAS boreholes VAS101-225, VAS106-225, and VAS121-225. The elevation of the Bedrock surface at these locations was relatively uniform and ranged from 536 ft AMSL to 541 ft AMSL. The typical elevation of the bedrock surface in northeast Elkhart County is between 550 and 600 ft AMSL (Duwelius and Silcox, 1991).

The elevation of the Bedrock surface beneath the Site is variable. A previously delineated bedrock valley is present beneath the western portion of the Site. The base of this north-south trending bedrock valley is at approximately 350 ft AMSL. Monitoring well WTB1 is the only other on-Site monitoring well that intersects the Bedrock.

3.2.6 GROUNDWATER FLOW

CRA completed quarterly groundwater elevation monitoring rounds on:

- Q1 - October 27, 2008
- Q2 - January 9, 2009
- Q3 - April 28, 2009
- Q4 - August 3, 2009
- Q5 - November 2, 2009
- Q6 - February 24, 2010
- Q7 - June 14, 2010

Groundwater elevation contour maps for the Upper Aquifer, Intermediate Aquifer and Lower Aquifer based on data collected during the October 27, 2008 and February 9, 2009 events are in the Phase I Groundwater Investigation report (CRA, 2009). CRA included groundwater elevation contour maps based on data collected during the April 28, 2009 through February 4, 2010 events in the Himco Annual Groundwater Monitoring Report (CRA, 2010). Figures 3.9, 3.10, and 3.11 present groundwater elevation contours derived from groundwater elevation data collected on June 14, 2010 for the Upper Aquifer, Intermediate Aquifer and Lower Aquifers, respectively.

The Phase I Groundwater Investigation report (CRA, 2009) identified data gaps in the monitoring well network with respect to determining the direction of horizontal groundwater flow as follows:

- There is a general lack of monitoring wells in the Upper Aquifer along the eastern Site boundary and east of the Site that makes interpretation of groundwater flow directions east of the Site difficult.
- The distribution of Intermediate and Deep Aquifer monitoring wells is similarly lacking in monitoring wells east of the Site. There are also gaps in the Intermediate and Lower Aquifer monitoring well network south of the Site.

Most of the Phase II monitoring wells were installed to investigate groundwater quality, however, they will aid in addressing these data gaps as noted below.

As shown on Figure 3.9, groundwater in the Upper Aquifer typically flows in a southerly direction. Overall groundwater flow is to the south, consistent with the regional groundwater flow pattern. The Upper Aquifer groundwater flow pattern on June 14, 2010 was similar to the groundwater flow pattern during previous monitoring rounds. Local features are superimposed on the regional flow pattern. For example, the groundwater elevation in monitoring well WT116A fluctuates and is occasionally on the order of three feet higher than nearby monitoring wells. There is a groundwater flow divide in the vicinity of WT116A, with shallow groundwater flowing south to southwest to the west of WT116A and flowing south to southeast to the east of WT116A. Phase II Upper Aquifer monitoring wells WTO2, located on the eastern Site boundary, and WT119B, located along the southern Site boundary, have improved the delineation of local groundwater flow directions in the Upper Aquifer.

Figure 3.10 shows that groundwater in the Intermediate Aquifer typically flowed south on June 14, 2010, consistent with the regional groundwater flow pattern and with the conditions during the previous monitoring rounds. Groundwater elevation data from Phase II Intermediate Aquifer monitoring wells WT120A and WT120B, located east of the Site, and WT106B, located south of the Site, have improved the delineation of local groundwater flow directions.

The groundwater elevation on June 14, 2010 in Intermediate Aquifer monitoring well WT101B was approximately 0.3 ft higher than groundwater elevations in Phase II Intermediate Aquifer monitoring wells WT101D and WT101E, which are screened above and below WT101B, respectively. In 1990, U.S. EPA installed WT101B in a layer of silty sand and sandy clay. WT101D and WT101E are screened in sand, which is typical of the Intermediate Aquifer. Therefore, higher groundwater elevations from monitoring well WT101C may not be representative of typical Intermediate Aquifer conditions. CRA recommends continued monitoring to determine if this is a seasonal groundwater condition.

Figure 3.11 presents the results from the June 14, 2010 groundwater elevation monitoring event for the Lower Aquifer. These data indicate a south-southeasterly groundwater flow direction in the Lower Aquifer consistent with the regional groundwater flow pattern and with the conditions during the previous monitoring rounds. None of the Phase II monitoring wells were installed in the Lower Aquifer.

Based on the June 14, 2010 groundwater elevation data, the horizontal hydraulic gradient across the Site ranged from 0.001 to 0.002 feet/feet in the Upper Aquifer, 0.001 to 0.002 feet/feet in the Intermediate Aquifer, and 0.001 feet/feet in the Lower Aquifer.

Figure 3.12 presents the vertical gradients between the hydrostratigraphic units as measured on June 14, 2010. There is generally an upward gradient across the Site, ranging from approximately 0.0004 feet/feet to 0.0028 feet/feet. There is a slight downward gradient at monitoring well nests WT117, WT113, and WT102. The strong downward gradient in the vicinity of WT116 is a result of the relative high groundwater elevation in Upper Aquifer monitoring well WT116A. The gradients observed during the Q7 - June 14, 2010 monitoring round were consistent with the conditions during the previous monitoring rounds.

3.3 CONCLUSIONS

The Unnamed Silt/Clay Layer is continuous beneath the southeast corner of the Site and southeast of the Site at the Phase II VAS borehole locations.

The Lower Aquifer underlies the Unnamed Silt/Clay Layer beneath the southeast corner of the Site and southeast of the Site at the Phase II VAS borehole locations. It occupies the interval between approximately 570 ft AMSL and 540 ft AMSL and consists primarily of fine brown sand.

Blue green friable shale underlies the overburden sequence at Phase II VAS boreholes VAS101-225, VAS106-225, and VAS121-225. The elevation of the Bedrock surface at these locations was relatively uniform and ranged from 536 ft AMSL to 541 ft AMSL.

The June 14, 2010 groundwater elevation monitoring data indicate a south-southeasterly groundwater flow direction beneath the Site, consistent with the regional groundwater flow pattern and with the conditions during the previous monitoring rounds.

CRA recommends that two new Upper Aquifer monitoring wells be installed to improve the definition of groundwater flow directions in the Upper Aquifer east and southeast of the Site and address the data gap identified during the Phase I Groundwater Investigation. Monitoring well WT121A will be installed at the location of VAS121, located southeast of the Site, and monitoring well WT120C will be installed at the location of well nest WT120.

4.0 GROUNDWATER QUALITY

4.1 INTRODUCTION

The objectives of the groundwater investigation and routine groundwater monitoring at the Site include an evaluation of groundwater quality around the perimeter of the landfill, immediately east of the Site, and south of the Site. This section of the report describes the groundwater quality in the vicinity of the Site and in particular discusses the data currently available with respect to the nature and extent of groundwater contamination emanating from the Site.

The Phase I Groundwater Investigation was the first stage of data collection and analysis to supplement the existing (pre-2008) data from the monitoring well network. The Phase I Groundwater Investigation identified several data gaps, and the Phase II Groundwater Investigation will aid in addressing the data gaps.

CRA has completed the following routine groundwater quality monitoring rounds at the Site to date:

- Baseline Groundwater Sampling (Q1) - October 28 to November 19, 2008
- Interim Groundwater Monitoring Program (Q2) - February 9 to February 19, 2009
- Interim Groundwater Monitoring Program (Q3) - April 29 to May 6, 2009
- Interim Groundwater Monitoring Program (Q4) - August 4 to August 18, 2009
- Interim Groundwater Monitoring Program (Q5) - November 3 to November 11, 2009
- Interim Groundwater Monitoring Program (Q6) - February 23 to March 4, 2010
- Interim Groundwater Monitoring Program (Q7) - June 15 to June 24, 2010
- Interim Groundwater Monitoring Program (Q8) - September 8 to September 15, 2010

The Phase I Groundwater Investigation report (CRA, 2009) previously provided the results of the Q1 and Q2 sampling events. CRA evaluated the data from the next four quarterly monitoring events, Q3 through Q6, in the Himco Annual Groundwater Monitoring Report (CRA, 2010). CRA also evaluated trends in the groundwater quality data and calculated background concentrations for metals and general chemistry parameters. The Himco Annual Groundwater Monitoring Report (CRA, 2010) includes statistical evaluations of the trends in groundwater quality data based on Q1 through Q6 results. This Phase II Groundwater Investigation report presents the results of the Q7 round of the Interim Groundwater Monitoring Program, which includes the initial groundwater samples from the Phase II monitoring wells installed in May 2010. A

subsequent report will include an evaluation of the results of the Q8 round of the Interim Groundwater Monitoring Program.

The rationale for the Phase II monitoring wells is as follows:

Well Name	*Screen Interval (ft AMSL)*	*Type of Monitoring Well*	*Rationale*
WT101D	699 - 704	Sentinel	Secondary metals peak
WT101E	639 - 644	Sentinel	Primary metals peak
WT106B	643 - 648	Sentinel	Downgradient of WT101E
WT114C	642 - 647	Detection	Primary VOCs peak
WT117C	737 - 742	Detection	Primary VOCs peak
WT117D	652 - 657	Detection	Primary chromium peak
WT119A	742 - 752	Replacement	Existing well damaged
WT120A	690 - 695	Sentinel	Secondary metals peak
WT120B	646 - 651	Sentinel	Primary metals peak
WTO2	726 - 731	Detection	Primary VOCs peak
WTO3	678 - 683	Detection	Primary metals peak
WTO4	631 - 636	Detection	Primary chromium peak

The analytical results for groundwater samples collected from the Phase II monitoring wells are discussed below. Where appropriate, or where requested by USEPA, CRA has provided iso-concentration contour maps (contour maps) for groundwater data. Consistent with common practice, CRA contoured non-detect results using SURFER version 8 software using half of the detection limit, except where estimated concentrations (qualified with "J") were reported at concentrations less than the reporting detection limit, in which case a value of 0.1 µg/L was used for non-detect concentrations.

As previously indicated, CRA has uploaded the database into an in-house software tool called e:DAT (electronic data access tool). The e:DAT for this Site can also be used to access aerial imagery, stratigraphic logs and any relevant well construction diagrams. Appendix A includes a copy of the e:DAT. Analytical results for Q7 of the Interim Groundwater Monitoring Program are compiled in Appendix B. Appendix C provides laboratory reports and data validation memoranda for Q7 of the Interim Groundwater Monitoring Program. Appendix D provides stabilization parameters measured during the Interim Groundwater Monitoring Program round.

4.2 VOLATILE ORGANIC COMPOUNDS

In June 2010, CRA collected 35 groundwater samples from 33 monitoring wells for VOCs analysis. Table 4.1 summarizes the VOCs detected in groundwater samples collected during the Q7 round of the Interim Groundwater Monitoring Program. CRA reviewed the frequency of detections of the individual VOCs and screened VOCs results against Primary MCLs.

No VOCs were detected in the Q7 Interim Groundwater Monitoring Program groundwater monitoring samples at concentrations that were greater than the corresponding Primary MCLs. During previous monitoring rounds benzene was detected in groundwater samples collected from WT115A at concentrations greater than its Primary MCL of 5 µg/L. Benzene was detected at a concentration of 0.69 J[1] µg/L in the groundwater sample collected from WT115A on June 17, 2010.

Only four VOCs were detected in more than 15 percent of the groundwater samples collected during the Q7 Interim Groundwater Monitoring Program:

- 1,1-Dichloroethane (1,1-DCA) = 31.4 percent
- Cis-1,2-Dichloroethene (cis-1,2-DCE) = 25.7 percent
- Vinyl chloride = 25.7 percent
- Benzene = 17.1 percent

CRA selected these compounds for discussion purposes because they are the most widespread VOCs detected in groundwater samples collected from the monitoring wells during the Q7 round of the Interim Groundwater Monitoring Program. In email correspondence regarding USEPA's August 19, 2010 comments on the Himco Annual Groundwater Monitoring Report (CRA, 2010), USEPA requested that the Phase II Groundwater Investigation Report include contour maps for all the organic compounds included in the trend analysis included in the Himco Annual Groundwater Monitoring Report (CRA, 2010). As requested, CRA has added bis(2-Ethylhexyl)phthalate and carbon disulfide to the discussion of groundwater quality at the Site.

In its August 19, 2010 comments on the Himco Annual Groundwater Monitoring Report (CRA, 2010), USEPA requested that groundwater data for 1,1-DCA and carbon disulfide be screened against Regional Screening Levels (RSL) Tapwater. As indicated in CRA's September 15, 2010 response to USEPA's comments, USEPA agreed that RSL Tapwater

[1] J - The parameter was detected at a concentration below the reporting limit and is therefore estimated.

values of 240 µg/L for 1,1-DCA and 10,000 µg/L for carbon disulfide are appropriate, since these calculated RSLs are based on a 1 x 10^{-5} excess cancer risk.

As requested, the analytical data for 1,1-DCA and carbon disulfide are compared to the calculated Tapwater RSLs in Section 4.2.1 and Section 4.2.5, respectively.

4.2.1 1,1-DICHLOROETHANE (1,1-DCA)

As summarized in Table 4.1, 1,1-DCA was detected in 11 of 35 groundwater samples collected from the monitoring well network, or 31.4 percent of the samples. The concentrations in the samples where 1,1-DCA was detected range from 0.48 J µg/L to 6.1 µg/L. There is no MCL for 1,1-DCA. USEPA has requested that the Trust compare 1,1-DCA results to the calculated Tapwater RSL of 240 µg/L, which is based on an excess cancer risk of 1 x 10^{-5}.

1,1-DCA was detected in Q7 Interim Groundwater Monitoring Program groundwater samples collected from the following monitoring wells:

Well	*Range of Concentrations (µg/L)*
WT101A	5.5
WT101B	0.48 J
WT101D	4.2
WT101E	3.8
WT106A	1.4
WT111A	3.7
WT114B	2.1
WT114C	6.1
WT116A	5.9
WT117B	4.4
WT117C	5.7

Figures 4.1 and 4.2 provide the 1,1-DCA results for groundwater samples collected from Upper and Intermediate Aquifer wells, respectively, during the Q7 Interim Groundwater Monitoring Program. 1,1-DCA was not detected (RDL=1.0 µg/L) in groundwater samples collected from the Lower Aquifer monitoring wells, therefore, CRA did not construct a Lower Aquifer 1,1-DCA concentration map.

As shown on Figures 4.1 and 4.2, 1,1-DCA was detected in groundwater samples collected from Upper and Intermediate Aquifer wells WT101A, WT101B, WT101D WT101E, WT111A, WT116A, WT117B, and WT117C, located along the southern Site boundary. 1,1-DCA was not detected at an RDL of 1.0 µg/L in groundwater samples collected from WT104A and WT105A, located south of the Site; however, 1,1-DCA was detected at a concentration of 1.4 µg/L in the groundwater sample collected from Upper Aquifer monitoring well WT106A, located south of the southeast corner of the Site. 1,1-DCA was detected east of the Site in groundwater samples collected from Intermediate Aquifer monitoring wells WT114B and WT114C, but not Upper Aquifer well WT114A.

The maximum 1,1-DCA concentration detected in Q7 groundwater samples was 6.1 µg/L, which is significantly less than the calculated Tapwater RSL of 240 µg/L. The pattern of widespread, low-concentration 1,1-DCA detections along the southern Site boundary is not consistent with a distinct, high-concentration VOC source. Similar to the previous monitoring results, the distribution of 1,1-DCA in groundwater at the Site is more consistent with residual contamination undergoing degradation in the absence of ongoing contaminant loading.

4.2.2 CIS-1,2-DICHLOROETHENE (CIS-1,2-DCE)

Cis-1,2-DCE was detected in 9 of 35 groundwater samples collected during the Q7 Interim Groundwater Monitoring Program round, or 25.7 percent of the samples. The concentrations in the samples where cis-1,2-DCE was detected range from 0.27 J µg/L to 1.7 µg/L. None of these concentrations were greater than the Primary MCL of 70 µg/L for cis-1,2-DCE.

The distribution of cis-1,2-DCE is almost identical to the distribution of 1,1-DCA (see Section 4.2.1). Cis-1,2-DCE was detected in groundwater samples from the following wells:

Well	*cis-1,2-DCE Concentration (µg/L)*
WT101A	0.32 J
WT101D	0.39 J
WT101E	0.27 J
WT106A	0.52 J
WT111A	0.59 J
WT114B	0.61 J
WT116A	1.7
WT117B	0.40 J
WT117C	1.0

Figures 4.3 and 4.4 provide the cis-1,2-DCE results from groundwater samples collected from Upper and Intermediate Aquifer wells, respectively, during the Q7 Interim Groundwater Monitoring Program. Cis-1,2-DCE was not detected (reporting detection limit (RDL)=1.0 µg/L) in groundwater samples collected from the Lower Aquifer monitoring wells, therefore, CRA did not construct a Lower Aquifer cis-1,2-DCE concentration map.

As shown on Figures 4.3 and 4.4, cis-1,2-DCE was detected in groundwater samples collected from Upper and Intermediate Aquifer monitoring wells WT101A, WT101D, WT101E, WT111A, WT116A, WT117B and WT117C located along the southern Site boundary. Cis-1,2-DCE was not detected (RDL=1.0 µg/L) in groundwater samples collected from Upper Aquifer monitoring wells WT104A and WT105A, but it was detected in the groundwater sample collected from WT106A, located south of the Site. Cis-1,2-DCE was not detected (RDL=1.0 µg/L) in Intermediate Aquifer monitoring well WT106B, located south of the Site, but it was detected east of the Site in groundwater samples collected from Intermediate Aquifer monitoring well WT114B.

The maximum cis-1,2-DCE concentration detected in Q7 groundwater samples was 1.7 µg/L, which is significantly less than the Primary MCL for cis-1,2-DCE of 70 µg/L. The pattern of widespread, low-concentration cis-1,2-DCE along the southern Site boundary detections is not consistent with a distinct, high-concentration VOC source. Similar to the previous monitoring results, the distribution of cis-1,2-DCE in

groundwater at the Site is more consistent with residual contamination undergoing degradation in the absence of ongoing contaminant loading.

4.2.3 VINYL CHLORIDE

As shown in Table 4.1, vinyl chloride was detected in 9 of 35, or 25.7 percent, of the samples CRA collected during the Q7 Interim Groundwater Monitoring Program round. When vinyl chloride was detected, its concentration in groundwater samples ranged from 0.41 J µg/L to 2 µg/L, as follows:

Well	*Vinyl Chloride Concentration (µg/L)*
WT101B	0.46 J
WT101E	0.45 J
WT106B	1.1
WT116A	1.2
WT116B	0.59 J
WT117B	0.64 J
WT117C	2.0
WT118B	0.48 J
WTB4	0.41 J

Figures 4.5, 4.6, and 4.7 provide the vinyl chloride results from groundwater samples collected from Upper, Intermediate and Lower Aquifer monitoring wells, respectively, during the Q7 Interim Groundwater Monitoring Program.

As shown on Figure 4.5, vinyl chloride was detected in groundwater samples collected from WT116A and WT117C, located along the southern edge of the Site. Vinyl chloride was not detected (RDL=1.0 µg/L) in any groundwater samples collected from the off-Site Upper Aquifer monitoring wells.

Figure 4.6 shows that vinyl chloride was only detected in groundwater samples collected from Intermediate Aquifer monitoring wells located along the southern Site boundary. Vinyl chloride was detected in the groundwater sample from Intermediate Aquifer monitoring well WT106B, located south of the Site, but it was not detected (RDL=1.0 µg/L) in groundwater samples collected from Intermediate monitoring wells WT114B, WT114C, WT120A, and WT120B, located east of the Site.

As shown on Figure 4.7, vinyl chloride was detected in a groundwater sample collected from Lower Aquifer monitoring well WTB4, located along the northern Site boundary. It was not detected (RDL=1.0 µg/L) in the other groundwater samples collected from Lower Aquifer monitoring wells.

None of the Q7 Interim Groundwater Monitoring Program vinyl chloride concentrations were greater than the Primary MCL of 2 µg/L. The widespread low level vinyl chloride detections do not suggest a distinct source with a high concentration VOC plume emanating from the landfill. Vinyl chloride is produced in reducing environments by the degradation of chlorinated organic compounds such as trichloroethene (TCE). The distribution of vinyl chloride in groundwater in the vicinity of the Site is more consistent with residual contamination undergoing degradation, probably with no ongoing source of VOC contaminants.

4.2.4 BENZENE

As shown in Table 4.1, benzene was detected in 6 of 35, or 17.1 percent, of the Q7 Interim Groundwater Monitoring Program groundwater samples. The concentration of benzene ranged from 0.62 J µg/L to 4.6 µg/L.

Since 2008, the concentration of benzene was greater than the Primary MCL of 5 µg/L in seven of the Q1 through Q6 groundwater monitoring samples, all collected from monitoring well WT115A. As shown on Figure 4.8, monitoring well WT115A is located in the southeast corner of the landfill and is within the limit of waste. The benzene results from groundwater samples collected from WT115A since 2008 are as follows:

Benzene at WT115A	
Date	***Concentration (µg/L)***
11/6/2008	5.7/9.3 (D)
2/12/2009	12
5/6/2009	1.0 U/0.43 J
8/5/2009	9.9

Benzene at WT115A	
Date	*Concentration (µg/L)*
11/6/2009	12/12
3/2/2010	9.8
6/17/2010	0.69 J
(D) - Duplicate sample result	
J - estimated concentration	
U - non detect at the associated value	

CRA did not identify any trends in the benzene results from groundwater samples collected from WT115A (CRA, 2010). This is consistent with stable plume conditions.

Benzene was also detected in the Q7 Interim Groundwater Monitoring Program samples collected from five other monitoring wells, as follows:

Well	*Range of Concentrations (µg/L)*
WT101A	2.8
WT111A	0.65 J
WT116A	4.6
WT117B	0.88 J
WT117C	0.62 J

Figures 4.8 and 4.9 provide the benzene results from groundwater samples collected from Upper and Intermediate Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program. Benzene was not detected (RDL=1.0 µg/L) in groundwater samples collected from the Lower Aquifer monitoring wells, therefore, CRA did not construct a Lower Aquifer benzene concentration map.

As shown on Figures 4.8 and 4.9, the Upper and Intermediate Aquifer monitoring wells where benzene was detected are located along the southern limit of waste. Five of the six wells are in the Upper Aquifer with WT117B in the Intermediate Aquifer. Benzene was not detected (RDL=1.0 µg/L) in any groundwater samples collected from the off-Site Upper and Intermediate Aquifer monitoring wells.

The maximum benzene concentration detected in Q7 groundwater samples was 4.6 µg/L, which is less than the Primary MCL of 5 µg/L. The distribution of benzene, which is restricted to the southern edge of the landfill, suggests a relatively weak, local

source of benzene possibly in the vicinity of WT115A. This is consistent with previous Interim Groundwater Monitoring program results.

4.2.5 CARBON DISULFIDE

Carbon disulfide was detected in 5 of 35, or 14.3 percent, of the Q7 Interim Groundwater Monitoring Program groundwater samples. The concentrations in the samples where carbon disulfide was detected range from 0.30 J µg/L to 2.1 µg/L. There is no MCL for carbon disulfide. The calculated Tapwater RSL for carbon disulfide is 10,000 µg/L.

Carbon disulfide was detected in groundwater samples from the following wells:

Well	*Concentration (µg/L)*
WT101B	2.1
WT101C	0.31 J/1.0 U
WT106B	0.30 J
WT117B	0.43 J
WTB4	0.90 J

Figures 4.10 and 4.11 provide the carbon disulfide results from groundwater samples collected from Intermediate and Lower Aquifer wells during the Q7 Interim Groundwater Monitoring Program. Carbon disulfide was not detected (RDL=1.0 µg/L) in groundwater samples collected from the Upper Aquifer monitoring wells, therefore, CRA did not construct an Upper Aquifer carbon disulfide concentration map.

As shown on Figures 4.10 and 4.11, carbon disulfide was detected in groundwater samples collected from Intermediate and Lower Aquifer monitoring wells WT101B, WT101C, and WT117B located along the southern Site boundary. Carbon disulfide was detected in the groundwater sample collected from Intermediate monitoring well WT106B, located south of the Site. Carbon disulfide was not detected (RDL=1.0 µg/L) in any other groundwater samples collected from off-Site Intermediate or Lower Aquifer monitoring wells.

Similar to vinyl chloride, the degradation of chlorinated organic compounds may produce carbon disulfide. As shown on Figures 4.10 and 4.11, the distribution of carbon disulfide is similar to the distribution of 1,1-DCA, cis-1,2-DCE, and vinyl chloride, and is consistent with residual contamination undergoing degradation.

4.3 SEMI VOLATILE ORGANIC COMPOUNDS

CRA collected 35 groundwater samples from 33 monitoring wells for SVOCs analysis during the Q7 round of the Interim Groundwater Monitoring Program. Table 4.2 summarizes the SVOCs detected in groundwater samples collected during the Q7 round of the Interim Groundwater Monitoring Program. CRA reviewed the frequency of detections of the individual SVOCs and screened SVOCs results against Primary MCLs.

Seven SVOCs were detected in the Q7 Interim Groundwater Monitoring Program groundwater samples. The detection frequency of these compounds ranged from 2.9 percent to 11.4 percent.

Bis(2-Ethylhexyl)phthalate is the only one of the seven detected SVOCs that has a Primary MCL (6 µg/L). Bis(2-Ethylhexyl)phthalate was detected in 1 of 35 or 2.9 percent of the Q7 Interim Groundwater Monitoring Program groundwater samples.

Figure 4.12 provides the bis(2-Ethylhexyl)phthalate results from groundwater samples collected from Upper Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program. Bis(2-Ethylhexyl)phthalate was not detected (RDL=2.0 µg/L) in groundwater samples collected from the Intermediate and Lower Aquifer monitoring wells, therefore, CRA did not construct Intermediate and Lower Aquifer bis(2-Ethylhexyl)phthalate contour maps.

As shown on Figure 4.12, the maximum concentration of bis(2-Ethylhexyl)phthalate in the groundwater samples collected during the Q7 round of the Interim Groundwater Monitoring Program was 0.98 J µg/L in the sample collected from Upper Aquifer monitoring well WT116A. Bis(2-Ethylhexyl)phthalate was not detected (RDL=2.0 µg/L) in any other groundwater samples collected from Upper Aquifer monitoring wells.

The Q7 Interim Groundwater Monitoring Program bis(2-Ethylhexyl)phthalate results are not typical of past monitoring results. During the Q1 Baseline Groundwater Sampling and the Q2 through Q6 rounds of the Interim Groundwater Monitoring Program, bis(2-Ethylhexyl)phthalate was detected in 35 of 190 groundwater samples (18.4 percent). Bis(2-Ethylhexyl)phthalate concentrations were greater than the Primary MCL of 6 µg/L in two of the 190 groundwater samples (1 percent). In previous monitoring rounds, bis(2-Ethylhexyl)phthalate was typically detected at low concentrations in groundwater samples that were widely dispersed, both laterally and vertically. The bis(2-Ethylhexyl)phthalate detections were also intermittent and did not occur routinely in the groundwater samples collected from any given monitoring well.

This is not the pattern a distinct, high concentration source of SVOCs would create, namely a plume emanating from the landfill. In fact, the presence of bis(2-Ethylhexyl)phthalate at relatively large distances both upgradient and downgradient of the Site suggests that the detected values at the Site may not be completely, if at all, attributable to Site activities.

4.4 METALS

4.4.1 INTRODUCTION

CRA collected 35 groundwater samples from 33 monitoring wells for TAL metals analysis during the Interim Groundwater Monitoring Program Q7 monitoring round. Table 4.3 summarizes the metals detected in the groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round. CRA's approach to screening organic chemicals was different than the approach to screening metals and general chemistry parameters because organic chemicals are typically the result of waste disposal activities while metals and general chemistry parameters also occur naturally in groundwater. CRA screened metals data against four sets of criteria:

1) Primary MCLs, which are health-based criteria
2) Secondary MCLs, which are aesthetic water quality criteria
3) Recommended Daily Allowances (RDAs), which are health-based criteria for specific dietary concerns with respect to iron, sodium, and calcium
4) Background Values (BVs)

CRA analyzed groundwater samples collected from monitoring wells WT102A, WT102B, and WT102C, located approximately 1260 feet north and upgradient of the Site for metals and general chemistry parameters. CRA performed statistical analysis on these data to determine background concentrations to compare with values measured at other locations at the Site in the Phase I Groundwater Investigation report (CRA, 2009) and the Himco Annual Groundwater Monitoring Report (CRA, 2010). Table 4.4 summarizes the BVs for metals parameters for the Upper, Intermediate, and Lower Aquifers. Several of the BVs exceeded their respective Primary MCL, Secondary MCL, or RDA.

The Phase I Groundwater Investigation (CRA, 2009) identified the following data gap:

> *Additional background groundwater quality data will be collected during the course of the Interim Groundwater Monitoring Program in order to have at least 8 data points available to calculate the background values (BVs), primarily in the Intermediate and Lower Aquifer background wells. CRA will include the recalculated BVs in the Phase II Groundwater Investigation Report.*

As of March 2010, CRA had collected six to seven data points for each background parameter. In June 2010, prior to the Q7 Interim Groundwater Monitoring Program round, the owner of the properties where the background monitoring wells nest (WT102A, WT102B and WT102C) is located denied the Himco Site Trust access to the wells. CRA understands that USEPA has contacted the property owners (D&J Realty) and is attempting to secure access to the wells.

Although CRA previously identified the BVs presented in Table 4.4 as preliminary, no additional data can be collected until access to the background wells is secured. CRA will recalculate the BVs, as appropriate, if more data become available, and will include the results in subsequent groundwater investigation reports.

4.4.1 PRIMARY MCLS

Arsenic was the only metal detected at a concentration greater than its Primary MCL in the Q7 Interim Groundwater Monitoring Program groundwater samples. Lead was detected at a concentration above the action level[2] established by USEPA in lieu of a Primary MCL.

Figure 4.13 shows the distribution of lead in the Upper Aquifer in groundwater beneath the Site. Upper Aquifer monitoring well WT115A is located in the southeast corner of the Site on the perimeter of the waste and approximately 200 feet north of the southern Site boundary. Groundwater samples collected from WT115A during previous monitoring rounds occasionally contained lead at concentrations that exceeded its Action Level. Lead was detected at a concentration of 15.8 µg/L in the groundwater

[2] Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For lead, the action level is 0.015 mg/L. The action level is discussed herein because there is no Primary MCL for lead. The action level applies to public water treatment facilities, and is included herein for discussion purposes only.

sample collected from WT115A on June 17, 2010. The concentrations of lead in groundwater samples collected from WT115A are as follows:

Sample Date	*Lead Concentration (µg/L)*
Action Level	*15*
11/6/2008	***231/280***
2/12/2009	***45.1***
5/6/2009	9.6/9.9
8/5/2009	5.5
11/6/2009	3.0 U/3.0 U
3/2/2010	4.0
6/17/2010	***15.8***

Groundwater samples collected from WT115A during rounds Q3 through Q6 did not contain lead at concentrations greater than the Action Level.

The concentration of arsenic was greater than the Primary MCL of 10 µg/L in the Q7 Interim Groundwater Monitoring Program groundwater samples collected from Intermediate Aquifer monitoring wells WT106B (12.2 mg/L), located south of the Site, and WT120B (19.7 mg/L), located east of the Site. Figure 4.14 shows the distribution of arsenic in the Intermediate Aquifer. The Q7 Interim Groundwater Monitoring Program results are consistent with the previous monitoring rounds, which include rare, widespread and inconsistent exceedances of Primary MCLs for metals. Continued groundwater quality monitoring will determine if the arsenic concentrations in groundwater samples collected from WT106B and WT120B persistently exceed the Primary MCL.

4.4.2 SECONDARY MCLS

As summarized in Table 4.3, aluminum, iron, and manganese were the only metals detected at concentrations that were greater than their respective Secondary MCLs in groundwater samples collected during the Q7 Interim Groundwater Monitoring Program round. Iron was detected at concentrations greater than the Secondary MCL in 32 out of 35 samples, or 91.4 percent. Manganese was detected at concentrations greater than the Secondary MCL in 26 of 35 samples, or 74.3 percent. Aluminum was detected at concentrations greater than the Secondary MCL in 13 of 35 groundwater samples, or 37.1 percent. CRA selected iron and manganese for discussion purposes because of their more numerous exceedances of their respective Secondary MCLs.

Figure 4.15 presents the concentration of iron in groundwater samples collected from Upper Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round. The Upper Aquifer BV for iron is 7,720 µg/L. The BV is greater than the Secondary MCL for iron (300 µg/L) and the RDA (1,000 µg/L). Iron was not routinely detected (RDL=100 µg/L) in the samples from WT104A, located south of the Site. During the Q7 Interim Groundwater Monitoring Program round the concentration of iron exceeded the Upper Aquifer BV in groundwater samples collected from WT101A, WT115A, and WT116A, located along the southern edge of the Site. The peak concentration of iron in the Upper Aquifer was 40,000 µg/L in a groundwater sample collected from monitoring well WT101A, located in the southeast corner of the Site. Iron concentrations greater than the BV do not extend off Site in the Upper Aquifer.

Figure 4.16 presents the concentration of iron in groundwater samples collected from Intermediate Aquifer monitoring wells. The BV of 1,870 µg/L for iron in the Intermediate Aquifer is greater than the Secondary MCL for iron (300 µg/L) and the RDA (1,000 µg/L). The maximum concentration of 8,670 µg/L of iron in the Intermediate Aquifer during the Q7 Interim Groundwater Monitoring Program round was detected in a sample collected from monitoring well WT117B, located near the western end of the southern Site boundary. The groundwater sample collected from Intermediate Aquifer monitoring well WTE1, located in the southeast corner of the Site, contained 165 µg/L of iron, which is less than the Secondary MCL and the RDA. The concentration of iron in the groundwater sample collected from WTE1 since November 2008 has fluctuated between 165 J µg/L and 6,090 µg/L. Further east, iron concentrations exceed the BV in samples from WT101E, WT114B, and WT120B. South of the southeast corner of the Site, the concentration iron of 5,410 µg/L in the groundwater sample from Intermediate Aquifer monitoring well WT106B exceeded the Intermediate Aquifer BV of 1,870 µg/L.

Figure 4.17 presents the concentration of iron in groundwater samples collected from Lower Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round. The concentration of iron in groundwater samples collected from Lower Aquifer monitoring wells ranged from 173 µg/L in a groundwater sample collected from monitoring well WTB4, located on the northern Site boundary, to 3,500 µg/L in a groundwater sample collected from monitoring well WTE3, located along the southern Site boundary. The Lower Aquifer BV for iron is 4,930 µg/L, which is greater than the Secondary MCL for iron (300 µg/L) and the RDA (1,000 µg/L). Iron concentrations in groundwater samples collected from the Lower Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round were less than the BV.

Figure 4.18 presents the concentration of manganese in groundwater samples collected from Upper Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round. The Upper Aquifer BV for manganese is 712 µg/L. The BV is greater than the Secondary MCL of 50 µg/L for manganese. While manganese concentrations routinely exceed the Secondary MCL, groundwater samples from WT101A (2,270 µg/L) and WT116A (726 µg/L) were the only Q7 Interim Groundwater Monitoring Program results that exceeded the BV for manganese. Manganese was not detected at concentrations greater than the BV in any off Site groundwater samples collected from the Upper Aquifer. The distribution of manganese in the Upper Aquifer during the Q7 Interim Groundwater Monitoring Program round is similar to previous monitoring events.

Figure 4.19 presents the concentration of manganese in groundwater samples collected from Intermediate Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round. The Intermediate Aquifer BV for manganese is 173 µg/L, which is greater than the Secondary MCL of 50 µg/L for manganese. There is a general pattern of manganese decreasing concentrations in groundwater samples from west to east. The highest manganese concentrations were 259 µg/L in a groundwater sample collected from monitoring well WTB3, located in the northwest corner of the Site, and 228 µg/L in a groundwater sample collected from monitoring well WT117B, located near the southwest corner of the Site. Groundwater samples from monitoring wells WTO4 (177 µg/L), located along the eastern Site boundary and WT114C (237 µg/L), located east of the Site, contained manganese at concentrations that exceed the Intermediate Aquifer BV. The lowest manganese concentrations were detected in groundwater samples collected from Intermediate Aquifer monitoring wells WT101B (32.3 µg/L), WT114B (37.3 µg/L), and WT120B (40.3 µg/L), located to the east. The concentration and distribution of manganese in the Intermediate Aquifer is not consistent with a source of manganese in the landfill and may be controlled by natural sources.

Figure 4.20 presents the concentration of manganese in groundwater samples collected from Lower Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round. The concentration of manganese ranged from 13.9 J µg/L/13.1 J µg/L in a duplicate groundwater sample collected from monitoring well WT101C, located in the southeast corner of the Site, to 180 µg/L in a groundwater sample collected from monitoring well WTB4, located on the northern Site boundary. None of these concentrations exceeded the Lower Aquifer BV for manganese of 570 µg/L, but the concentration of manganese in the sample from WTB4 was greater than the Secondary

MCL. The distribution of manganese in the Lower Aquifer during the Q7 Interim Groundwater Monitoring Program round is similar to previous monitoring events.

4.4.3 RECOMMENDED DAILY ALLOWANCES (RDAs)

As shown in Table 4.3, calcium, iron and sodium were detected at concentrations that were greater than their respective RDAs during the Q7 Interim Groundwater Monitoring Program round. Iron concentrations were greater than the RDA of 1 mg/L in 24 of 35 samples (68.6 percent) collected during the Q7 Interim Groundwater Monitoring Program round. The RDAs for calcium and sodium are 250 mg/L and 150 mg/L, respectively. Calcium and sodium concentrations were detected at concentrations greater than their respective RDAs in 3 of 35 groundwater samples (8.6 percent) and 2 of 35 groundwater samples (5.7 percent), respectively.

The iron distribution in groundwater was discussed in Section 4.4.2.

CRA selected calcium for discussion purposes because calcium sulfate was one of the principal waste materials disposed of in the landfill. Figures 4.21, 4.22, and 4.23 provide calcium concentrations in the Upper, Intermediate and Lower Aquifers, respectively.

Figure 4.21 presents calcium concentration contours for the Upper Aquifer. There is a plume of calcium in the Upper Aquifer defined by the RDA of 250 mg/L. The Upper Aquifer BV is 275 mg/L for calcium. The peak calcium concentration in the Upper Aquifer during the Q7 Interim Groundwater Monitoring Program round was 689 mg/L in a groundwater sample collected from monitoring well WT116A. The concentration of calcium also exceeded the RDA in the groundwater sample collected from WT101A, located in the southeast corner of the Site. Calcium concentrations in excess of the RDA did not extend off Site in the Upper Aquifer. This is similar to previous monitoring results.

Figure 4.22 presents the concentration of calcium in groundwater samples collected from Intermediate Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program. The concentration of calcium in Intermediate Aquifer groundwater was less than the RDA of 250 mg/L, with a maximum detected concentration of 213 mg/L in a groundwater sample collected from monitoring well WT117B, located along the southern Site boundary. Similar to previous monitoring rounds, calcium concentrations in excess of the RDA in the Intermediate Aquifer are rare. The BV for calcium in the Intermediate Aquifer is 86 mg/L. There is a general trend of increasing calcium concentration in groundwater to the southwest in the Intermediate Aquifer.

Groundwater samples collected from monitoring wells located along the southern Site boundary contained calcium concentrations that exceeded the BV. Concentrations of calcium generally decreased to the east. Northeast of the WT101 monitoring well nest, calcium concentrations are generally less than the BV.

Figure 4.23 presents the concentration of calcium in groundwater samples collected from Lower Aquifer monitoring wells. The concentrations of calcium in Lower Aquifer groundwater samples from the Q7 Interim Groundwater Monitoring Program round were less than the RDA of 250 mg/L and the BV of 122 mg/L for the Lower Aquifer. The concentration of calcium in the samples collected from the Lower Aquifer monitoring wells ranged from 50.1/48.7 mg/L (duplicate sample) in a groundwater sample collected from monitoring well WT101C, located in the southeast corner of the Site, to 117 mg/L in a groundwater sample collected from monitoring well WTE3, located on the southern Site boundary. The Q7 Interim Groundwater Monitoring Program Lower Aquifer calcium results are consistent with previous results that are consistently less than the RDA and only occasionally greater than the Lower Aquifer BV.

4.5 GENERAL CHEMISTRY PARAMETERS

Groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round were analyzed for bromide, cyanide, chloride, and sulfate. Table 4.3 summarizes the detections of these general chemistry parameters in groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round.

Cyanide was detected in 5 of 35 samples collected during Interim Groundwater Monitoring Program Q7 monitoring round. Cyanide concentrations ranged from 0.0052 J mg/L to 0.04 mg/L. Consistent with previous results, these concentrations were less than the Primary MCL of 0.2 mg/L for cyanide.

Chloride was detected in all 35 groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round. The concentration of chloride was greater than its Secondary MCL of 250 mg/L in one sample, (377 mg/L) in a groundwater sample collected from Intermediate Aquifer monitoring well WT114A, located east of the Site. These results are consistent with the sporadic exceedances of the chloride Secondary MCL during previous monitoring rounds.

Sulfate was detected in all 35 groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round. Sulfate concentrations were

greater than the Secondary MCL of 250 mg/L in 8 of these samples. CRA calculated the following BVs for sulfate in the Himco Annual Groundwater Monitoring Report (CRA, 2010):

- Upper Aquifer - 965 mg/L
- Intermediate Aquifer - 430 mg/L
- Lower Aquifer - 68.7 mg/L

CRA selected sulfate for discussion purposes because calcium sulfate was one of the primary waste materials deposited in the landfill and it because it is present at concentrations greater than the Secondary MCL.

Figure 4.24 presents the concentration of sulfate in groundwater samples collected from Upper Aquifer monitoring wells during the Interim Groundwater Monitoring Program Q7 monitoring round. The Upper Aquifer BV is 965 mg/L for sulfate. The maximum concentration of sulfate detected in groundwater samples from the Upper Aquifer during the Interim Groundwater Monitoring Program Q7 monitoring round was 940 mg/L in a groundwater sample collected from monitoring well WT116A, located along the southern Site boundary. The groundwater samples from Upper Aquifer monitoring wells WT101A, WT111A, WT117C, and WT119B contained sulfate concentrations that exceed the Secondary MCL of 250 mg/L, but were less than the Upper Aquifer BV of 965 mg/L for sulfate. This is consistent with the results from previous monitoring rounds. Sulfate concentrations in excess of the 250 mg/L in the Upper Aquifer are restricted to the area of the southern Site boundary.

Figure 4.25 presents the concentration of sulfate in groundwater samples collected from Intermediate Aquifer monitoring wells during the Interim Groundwater Monitoring Program Q7 monitoring round. The Intermediate Aquifer BV is 430 mg/L for sulfate. It was not exceeded in the Intermediate Aquifer groundwater samples collected during the Interim Groundwater Monitoring Program Q7 monitoring round. Sulfate concentrations exceeded the secondary MCL of 250 mg/L in groundwater samples collected from Intermediate Aquifer monitoring wells WT117B and WT117D, located near the south west corner of the Site. Elsewhere, sulfate concentrations in the Intermediate Aquifer beneath the Site were less than 250 mg/L. CRA evaluated trends in the groundwater quality data in the Annual groundwater monitoring report CRA, 2010) and identified decreasing trends in the sulfate concentrations in groundwater samples collected from Intermediate Aquifer monitoring wells WT101B, WT102B and WTE1. Sulfate concentrations in excess of 250 mg/L in the Intermediate

Aquifer are restricted to the southern Site boundary. This is consistent with the results from previous monitoring rounds.

Figure 4.26 shows the concentration of sulfate in groundwater samples collected from Lower Aquifer monitoring wells during the Interim Groundwater Monitoring Program Q7 monitoring round. The concentration of sulfate in groundwater samples collected from Lower Aquifer monitoring wells ranged from 0.26 J mg/L in a groundwater sample collected from monitoring well WT101C located in the southeast corner of the Site, to 166 mg/L in a groundwater sample collected from monitoring well WTE3, located near the southern Site boundary. Sulfate concentrations in groundwater samples collected from Lower Aquifer monitoring wells did not exceed the Secondary MCL of 250 mg/L. The only sulfate concentration that was greater than the Lower Aquifer BV of 68.7 mg/L was in a groundwater sample collected from WTE3. This is consistent with the results of previous monitoring rounds. CRA identified a decreasing trend in the sulfate concentrations in groundwater samples collected from Lower Aquifer monitoring well WT102C in the Himco Annual Groundwater Monitoring Report (*CRA, 2010*).

5.0 PHASE I VAS RESULTS VERSUS PHASE II MONITORING WELL RESULTS

5.1 INTRODUCTION

This Section compares the data collected from Phase II groundwater monitoring wells with the data collected at these same locations during the Phase I VAS program. This Section also discusses a replacement well (WT119B) installed as part of the Phase II well installation program.

Some of the Phase I VAS boreholes were installed adjacent to existing monitoring wells to evaluate the well design of the existing monitoring well network, particularly with respect to the vertical distribution of groundwater contamination in the vicinity of the Site. CRA designed the Phase II monitoring well installation program to fill data gaps identified during the Phase I VAS program, or other gaps in the monitoring network. The following Phase II monitoring wells were installed in May 2010:

Well Name	*Screen Interval (ft AMSL)*	*Type of Monitoring Well*	*Rationale*
WT101D	699 - 704	Sentinel	Secondary metals peak
WT101E	639 - 644	Sentinel	Primary metals peak
WT106B	643 - 648	Sentinel	Downgradient of WT101E
WT114C	642 - 647	Detection	Primary VOCs peak
WT117C	737 - 742	Detection	Primary VOCs peak
WT117D	652 - 657	Detection	Primary chromium peak
WT119B	742 - 752	Replacement	Existing well damaged
WT120A	690 - 695	Sentinel	Secondary metals peak
WT120B	646 - 651	Sentinel	Primary metals peak
WTO2	726 - 731	Detection	Primary VOCs peak
WTO3	678 - 683	Detection	Primary metals peak
WTO4	631 - 636	Detection	Primary chromium peak

Historic groundwater data indicated that residential wells located east of the Site have been affected by Site-related contaminants. VAS borehole VAS114 (shown on Figure 2.1) was installed in the vicinity of residential well RW-22 (shown on Figure 1.2) located at 54305 Westwood Drive. 1,2-dichloropropane was detected in a historic groundwater sample from RW-22 at a concentration that was greater than its Primary MCL. Phase I VAS borehole VAS120 was installed east of VAS114 to help delineate the lateral and vertical extent of any VOCs in groundwater east of the Site.

VAS boreholes VASO, VAS101, VAS116, and VAS117 were installed around the southern and eastern perimeters of the landfill. These boreholes were completed at existing or former monitoring well nests, as shown on Figure 2.1.

Plumes of VOCs or SVOCs have never been detected south of the Site; however, there is a potential for Site-related contaminants to migrate south of the Site. VAS boreholes VAS-105 and VAS-106 were installed adjacent to existing monitoring wells WT105A and WT106A, respectively. The results of groundwater samples collected from these VAS boreholes delineate the southern extent of the contaminant plume.

5.2 WT101D

VAS borehole VAS101-150 was installed adjacent to monitoring well nest WT101 to investigate the vertical distribution of contaminants in the vicinity of WT101. Phase II monitoring well WT101D was installed to investigate a secondary peak in metals concentrations in the groundwater samples collected from 701 ft AMSL in Phase I borehole VAS101-150. The following table compares the arsenic, calcium, iron, lead and manganese data for the groundwater samples collected from WT101D in June 2010 to the concentrations in the 701 ft AMSL groundwater sample from VAS101-150:

	Primary MCL	*Secondary MCL*	*RDA*	*VAS101-150 (701 ft AMSL)*	*WT101D (06/15/10)*
Arsenic (µg/L)	10	-	-	61.1	1.2
Calcium (mg/L)	-	-	250	735	93.51
Chromium (µg/L)	100	-	-	953	10 U
Iron (mg/L)	-	300	1,000	150	2.15
Lead (µg/L)	15	-	-	122	3.0 U
Manganese (µg/L)	-	50	-	3,320	57.1

Arsenic, calcium, iron, and manganese concentrations in the sample from the monitoring well were 1 to 2 orders of magnitude less than the corresponding VAS borehole sample. The VAS sample detections are biased high with respect to arsenic, calcium, iron, lead, and manganese concentrations. Similarly, lead was not detected (RDL = 3.0 µg/L) in the sample from WT101D, but was detected at a concentration of 122 µg/L in the sample from monitoring well WT101E. Chromium was detected at a concentration of 953 µg/L in the 701 ft AMSL sample from VAS101-150, but chromium was not detected (RDL = 10 µg/L) in the sample from monitoring well WT101D. The lead and chromium detections in VAS borehole samples are false positive detections and are not representative of groundwater quality. The monitoring well data for WT101D are consistent with the relatively rare detections of chromium in groundwater samples collected from the monitoring well network.

5.3 WT101E

Phase II monitoring well WT101E was installed to investigate peak metal concentrations in the groundwater samples collected from Phase I borehole VAS101-150. The maximum arsenic, calcium, iron, lead and manganese concentrations in the groundwater samples collected from the VAS101-150 groundwater samples all occur in the sample collected from an elevation of 641 ft AMSL. The following table compares the data for the groundwater sample collected from WT101E in June 2010 to the concentrations measured in the 641 ft AMSL sample from VAS101-150:

	Primary MCL	*Secondary MCL*	*RDA*	*BV*	*VAS101-150 (641 ft AMSL)*	*WT101E (06/15/10)*
Arsenic (µg/L)	10	-	-	7.9	110	3.6
Calcium (mg/L)	-	-	250	86	1,060	101
Iron (mg/L)	-	0.3	1	1.87	290	4.46
Chromium (µg/L)	100	-	-	89	1,970	10.0 U
Lead (µg/L)	15	-	-	3.0 U	187	3.0 U
Manganese (µg/L)	-	50	-	173	5,250	53.1

Arsenic, calcium, iron, and manganese concentrations in the sample from the monitoring well were 1 to 2 orders of magnitude less than the corresponding VAS borehole sample. The VAS sample detections are biased high with respect to arsenic, calcium, iron, and manganese concentrations. Similarly, lead was not detected (RDL = 3.0 µg/L) in the sample from monitoring well WT101E, but was detected at a concentration of 187 µg/L in the sample from VAS101-150. While not the maximum concentration, chromium was detected at a concentration of 1,970 µg/L in the 641 ft AMSL sample from VAS101-150, but chromium was not detected (RDL = 10 µg/L) in the sample from monitoring well WT101E. Lead and chromium detections in VAS borehole samples represent false positive detections and are not representative of groundwater quality. The monitoring well data for WT101E are consistent with the relatively rare detections of chromium in groundwater samples collected from the

monitoring well network. Trace concentrations (<5 µg/L) of VOCs were detected in the groundwater samples collected from WT101E.

5.4 WT106B

CRA installed Phase II Intermediate Aquifer monitoring well WT106B downgradient of WT101E to provide lateral delineation of contaminants in the vicinity of monitoring well nest WT101, and act as a downgradient sentinel well in the Intermediate Aquifer south of the Site. Vinyl chloride was detected at a concentration of 1.1 µg/L in the sample from WT106B, less than the Primary MCL of 2.0 µg/L.

The concentration of arsenic in the Q7 Interim Groundwater Monitoring Program groundwater sample collected from Intermediate Aquifer monitoring well WT106B was greater than the Primary MCL of 10 µg/L.

5.5 WT114C

Phase II Intermediate Aquifer monitoring well WT114C was installed to evaluate the peak VOC concentrations in the groundwater samples collected from VAS114-150 during the Phase I Groundwater Investigation. The maximum 1,1-DCA concentration from the VAS114-150 groundwater samples was 8.7 µg/L in the sample collected from 645 ft AMSL. 1,1-DCA was the only VOC detected in the sample collected from 645 ft AMSL in borehole VAS114-150. Monitoring well WT114C was sampled in June 2010 and 1,1-DCA was detected in the sample at a concentration of 6.1 µg/L. 1,1-DCA was the only VOC detected in the sample collected from Intermediate Aquifer monitoring well WT114C. This is consistent with the widespread, low concentration detections of 1,1-DCA in groundwater south and east of the Site. The VOC results for the VAS samples from VAS114-150 appear to be representative of groundwater quality.

One of the objectives of the groundwater investigations is to delineate 1,2-dichloropropane detected historically in a sample from the residential well at 54305 Westwood Drive, immediately east of the Site. The results of the groundwater quality monitoring at the WT114 monitoring well nest indicate that there is no plume of VOCs in excess of primary MCLs in the vicinity at 54305 Westwood Drive. CRA recommends continuing routine groundwater monitoring to confirm the groundwater quality results for groundwater samples collected to date from the WT114 monitoring well nest.

5.6 WT117C

Phase II Upper Aquifer monitoring well WT117C was installed to evaluate the peak VOC concentrations in the groundwater samples collected from VAS117-150 during the Phase I Groundwater Investigation. The following table compares the data for the groundwater sample collected from WT117C in June 2010 to the concentrations measured in the 739 ft AMSL sample from VAS117-150:

	Primary MCL	*Tapwater RSL*	*VAS117-150 (739 ft AMSL)*	*WT117C (06/17/10)*
1,1-DCA (µg/L)	-	24	4.8	5.7
cis-1,2-DCE (µg/L)	70	-	0.72 J	1.0
Vinyl Chloride (µg/L)	2	-	1.9	2.0

These results are consistent with the widespread, low concentration detections of vinyl chloride and 1,2-DCE in the Upper Aquifer groundwater along the southern edge of the landfill. The VOC results for the VAS samples from VAS117-150 appear to be representative of groundwater quality.

5.7 WT117D

Phase II Intermediate Aquifer monitoring well WT117D was installed to evaluate the peak chromium concentration in the groundwater samples collected from VAS117 during the Phase I Groundwater Investigation. The maximum chromium concentration from the VAS117 groundwater samples was 1,050 µg/L in the sample collected from 653 ft AMSL. Monitoring well WT117D was sampled in June 2010 and chromium was not detected (RDL = 10 µg/L). This is consistent with the relatively rare detections of chromium in groundwater samples collected from the monitoring well network. This sample confirms CRA's earlier statement that the chromium detections in VAS borehole samples are false positive detections and are not representative of groundwater quality.

5.8 WT119B

CRA installed Phase II Upper Aquifer monitoring well WT119B to replace damaged monitoring well WT119A. CRA sampled WT119B in June 2010. VOCs and SVOCs were not detected in the groundwater sample collected from WT119B. Metals and general

chemistry compounds were detected, and the data are discussed in Section 4.0 of this report.

5.9 WT120A

CRA installed Phase II Upper Aquifer monitoring well WT120A to investigate a secondary peak of metal concentrations in the groundwater samples collected from Phase I borehole VAS120-150. The following table compares the data for the groundwater sample collected from WT120A in June 2010 to the concentrations measured in the 673 ft AMSL sample from VAS120-150:

	Primary MCL	*Secondary MCL*	*RDA*	*VAS120-150 (673 ft AMSL)*	*WT120B (06/21/10)*
Arsenic (µg/L)	10	-	-	54.1	4.3
Calcium (mg/L)	-	-	250	446	74.5
Chromium (µg/L)	100	-	-	915	10 U
Iron (mg/L)	-	300	1,000	77.6	0.732
Lead (µg/L)	15	-	-	65.5	3.0 U
Manganese (µg/L)	-	50	-	220	101

Chromium was detected at a concentration of 915 µg/L in the 692 ft AMSL sample from VAS120-150. Chromium was not detected (RDL = 10 µg/L) in the sample from monitoring well WT120A. This is consistent with the relatively rare detections of chromium in groundwater samples collected from the monitoring well network. As evidenced by these data and others, the chromium detection in VAS borehole samples represent false positive detections and are not representative of groundwater quality.

5.10 WT120B

CRA installed Phase II Upper Aquifer monitoring well WT120B to investigate maximum metal concentrations in the groundwater samples collected from Phase I borehole VAS120-150.

The maximum arsenic, calcium, iron, lead, and manganese concentrations in the groundwater samples collected from the VAS120-150 borehole all occur in the sample collected from an elevation of 652 ft AMSL. The following table compares the data for

the groundwater sample collected from WT120B in June 2010 to the concentrations measured in the 652 ft AMSL sample from VAS120-150:

	Primary MCL	*Secondary MCL*	*RDA*	*VAS120-150 (652 ft AMSL)*	*WT120B (06/21/10)*
Arsenic (µg/L)	10	-	-	90.2	19.7
Calcium (mg/L)	-	-	250	1,170	79.5
Chromium (µg/L)	100	-	-	874	10 U
Iron (mg/L)	-	300	1,000	313	3.36
Lead (µg/L)	15	-	-	253	3.0 U
Manganese (µg/L)	-	50	-	757	40.3

Calcium, iron, and manganese concentration in the sample from the monitoring well were 1 to 2 orders of magnitude lower than the corresponding VAS borehole sample. The VAS sample detections are biased high with respect to calcium, iron, and manganese concentrations. Similarly, lead was not detected (RDL = 3.0 µg/L) in the sample from WT120B but was detected at a concentration of 253 µg/L in the sample from VAS120-150. While not the maximum concentration, chromium was detected at a concentration of 874 µg/L in the 652 ft AMSL sample from VAS120-150, but chromium was not detected (RDL = 10 µg/L) in the sample from monitoring well WT120B. This is consistent with the relatively rare detections of chromium in groundwater samples collected from the monitoring well network. The lead and chromium detection in VAS borehole samples represent false positive detections and are not representative of groundwater quality.

5.11 WTO2

Phase II Upper Aquifer monitoring well WTO2 was installed to evaluate the peak VOC concentrations in the groundwater samples collected from VASO-50 during the Phase I Groundwater Investigation. The maximum 1,1-DCA concentration from the VASO-50 groundwater samples was 7.1 µg/L in the sample collected from 728 ft AMSL. Vinyl chloride and 1,2-DCE were detected in the VASO-50 sample from 728 ft AMSL at concentrations of 2.2 µg/L and 1.2 µg/L, respectively. Monitoring well WTO2 was sampled in June 2010. 1,1-DCA, vinyl chloride and 1,2-DCE were not detected (RDL = 1.0). These data are consistent with the widespread, low concentration detections of VOCs in Upper Aquifer groundwater south and east of the Site.

5.12 WTO3

Phase II Intermediate Aquifer monitoring well WTO3 was installed to investigate peak metal concentrations in the groundwater samples collected from Phase I borehole VASO-150. The maximum arsenic, calcium, iron, lead and manganese concentrations in the groundwater samples collected from the VASO-150 groundwater samples all occur in the sample collected from an elevation of 673 ft AMSL. The following table compares the data for the groundwater sample collected from WTO3 in June 2010 to the concentrations measured in the 673 ft AMSL sample from VASO-150:

	Primary MCL	*Secondary MCL*	*RDA*	*VASO-150 (673 ft AMSL)*	*WTO3 (06/16/10)*
Arsenic (µg/L)	10	-	-	184	3.6
Calcium (mg/L)	-	-	250	2,360	51.7
Chromium (µg/L)	*100*	-	-	243	*10 U*
Iron (mg/L)	-	300	1,000	345	0.491
Lead (µg/L)	15	-	-	148	3.0 U
Manganese (µg/L)	-	50	-	14,100	149

Arsenic, calcium, iron, and manganese concentrations in the sample from the monitoring well were 1 to 2 orders of magnitude less than the corresponding VAS borehole sample. VAS sample results are biased high with respect to arsenic, calcium, iron, and manganese concentrations. Similarly, lead was not detected (RDL = 3.0 µg/L) in the sample from WTO3 but was detected at a concentration of 148 µg/L in the sample from borehole VASO-150. Chromium was present at a concentration of 243 µg/L in the 673 ft AMSL sample from VASO-150. Chromium was not detected (RDL = 10 µg/L) in the sample from monitoring well WTO3. These data are consistent with the relatively rare detections of lead and chromium in groundwater samples collected from the monitoring well network. The lead and chromium detections in VAS borehole samples represent false positive detections and are not representative of groundwater quality.

5.13 WTO4

CRA installed Phase II Intermediate Aquifer monitoring well WTO4 to evaluate the peak chromium concentration in the groundwater samples collected from VASO-150 during the Phase I Groundwater Investigation. The maximum chromium concentration from the VASO-150 groundwater samples was 7,680 µg/L in the sample collected from 633 ft AMSL. Monitoring well WTO4 was sampled in June 2010 and chromium was

detected at a concentration of 2.4 µg/L. The VAS sample concentration was three orders of magnitude higher than the monitoring well sample concentration, which is consistent with other VAS sample results that are based high and are not representative of actual groundwater conditions.

6.0 PHASE II VERTICAL AQUIFER SAMPLING (VAS) RESULTS

6.1 INTRODUCTION

Figure 2.1 presents the locations of the Phase II VAS boreholes. The following is the rationale for the Phase II VAS boreholes:

	Rationale
Landfill Area	
VAS101-225	Investigate eastern and vertical plume(s) limits
VAS115-175	Investigate core of plume and vertical plume(s) limits
Southern off Site	
VAS106-225	Investigate southern and vertical plume(s) limits
VAS121-225	Investigate southern and vertical plume(s) limits

CRA collected data from VAS115-175 to aid in the vertical delineation of benzene and metals in groundwater at this location in the Upper and Intermediate Aquifers. CRA collected groundwater screening data from VAS101-225, VAS106-225, and VAS121-225 to determine if groundwater contaminants are present in the Lower Aquifer, if preferential contaminant migration pathways exist in the Lower Aquifer, and if permanent Lower Aquifer monitoring wells are required at these locations.

CRA collected groundwater samples from the four Phase II VAS boreholes and analyzed them for VOCs. Table 6.1 summarizes the VOCs detected in groundwater samples collected from the Phase II VAS boreholes.

Benzene was detected in groundwater samples collected from 737 ft AMSL and 727 ft AMSL from VAS115 at concentrations of 18 µg/L and 16 µg/L, respectively. These detections are greater than the Primary MCL of 5 µg/L for benzene. These were the only Phase II VAS groundwater samples containing VOCs at a concentration greater than a Primary MCL.

CRA selected the following VOCs for screening purposes and further discussion because they were frequently detected or, in the case of benzene, cis-1,2 DCE and vinyl chloride, they were frequently detected in groundwater samples collected from monitoring wells located in the vicinity of the southern portion of the Site:

Parameter	*Primary MCL*	*Detected Percentage*	*Maximum Detection*	*Percentage of MCL*	*Number of Exceedances*
	(µg/L)		(µg/L)		
Carbon disulfide	-	89%	19	-	-
Toluene	1,000	83%	1.7	0.17%	0
Xylene (total)	10,000	50%	1.7	0.017%	0
Methyl cyclohexane	-	46%	1	-	-
Cyclohexane	-	39%	0.7	-	-
1,1-DCA	-	28%	7.5	-	-
Benzene	5	17%	18	360%	2
MEK	-	13%	5.8	-	-
cis-1,2-DCE	70	11%	1.4	2%	0
Vinyl chloride	2	7%	0.68	34%	0

The VOC data for the VAS groundwater samples are characterized by the presence of widespread, low-concentration VOCs. This is not consistent with distinct plumes of VOCs that are greater than their respective MCLs or preferential contaminant migration pathways.

CRA collected 46 groundwater samples from the four Phase II VAS boreholes and analyzed them for TAL metals. Table 6.2 summarizes the TAL metals detected in groundwater samples collected from the Phase II VAS boreholes. Several metals had widespread exceedances of their respective criteria. These include Primary MCLs/Action Level (arsenic, chromium, and lead), Secondary MCLs (aluminum, iron, and manganese) and RDA (calcium) as shown in Table 6.2. These metals are discussed in the following subsections because they were frequently detected, often at concentrations that were greater than their respective criteria.

CRA also selected sulfate for discussion purposes because it was detected in 41 percent of the Phase II VAS groundwater samples and calcium sulfate is one of the primary landfill constituents.

The groundwater sample data collected from the Phase II VAS boreholes are for screening purposes only. They are not compliance samples. VAS groundwater samples were turbid, usually over 1,000 NTU. VAS groundwater samples were collected via the SimulProbe® sampling tool. These are essentially grab samples and the SimulProbe® sampler is not designed to address sample turbidity. This contrasts with the groundwater samples collected from the monitoring wells where low-flow groundwater sampling techniques minimize sample turbidity. CRA's review of VAS groundwater screening results as compared to the Phase II monitoring well groundwater quality results, as provided in Section 5.0, concluded that arsenic, calcium, iron, and manganese concentrations in samples from monitoring wells were generally one to two orders of

magnitude less than the corresponding VAS borehole sample, and VAS sample results are biased high with respect to arsenic, calcium, iron, and manganese concentrations. Lead and chromium were present, sometimes at concentrations in excess of 1,000 µg/L, in the VAS groundwater screening samples but they were typically not detected (RDL = 10 µg/L) in the compliance samples from the corresponding monitoring well sample. The lead and chromium detected in VAS borehole groundwater screening samples generally represent false positive detections and are not representative of groundwater quality. This is consistent with the relatively rare detections of lead and chromium in groundwater samples collected from the other wells in the monitoring well network.

Overall, CRA considers the metals results from the VAS groundwater samples to be less representative of actual groundwater quality than the VOC results, which are less affected by sample turbidity.

6.2 VAS101-225

Figure 2.1 presents the location of Phase II borehole VAS101-225. VAS101-60 and VAS101-150 were installed during the Phase I Groundwater Investigation adjacent to existing monitoring wells WT101A, WT101B, and WT101C, located in the southeast corner of the Site. VAS101-60 and VAS101-150 were installed to investigate eastern and vertical plume limits in the Upper and Intermediate Aquifers. Based on the results of the Phase I Groundwater Investigation, CRA installed Phase II monitoring wells WT101D and WT101E in the Intermediate Aquifer. VAS101-225 was completed during the Phase II Groundwater Investigation to determine if groundwater contaminants are present in the Lower Aquifer, if preferential contaminant migration pathways exist in the Lower Aquifer, and a permanent Lower Aquifer monitoring well is required at this location. VAS101-60, VAS101-150, VAS101-225, WT101A, WT101B, WT101C, WT101D and WT101E and the stratigraphy in the vicinity of the WT101 wells are shown on Figure 3.4 (Cross Section B-B').

The concentration of VOCs versus elevation in groundwater samples collected from VAS101-60, VAS101-150 and VAS101-225 are provided on Figure 6.1. CRA collected Phase II groundwater screening samples from VAS101-225 at elevations of approximately 546 ft AMSL to 606 ft AMSL. VOCs were rarely detected and when they were their concentrations were less than 3 µg/L. Based on VOC results, there is no evidence of VOC impact to Lower Aquifer groundwater or preferential contaminant migration pathways in the vicinity of VAS101-225.

Figure 6.2 provides a plot of concentration of selected metals and sulfate with depth in groundwater samples collected from VAS101-225. For the Phase II VAS101-225 samples, between 546 ft AMSL and 606 ft AMSL, calcium concentrations peak at 735 mg/L in the groundwater sample collected from 556 ft AMSL. Manganese concentrations showed a similar pattern, with a peak concentration of 3,850 µg/L in the groundwater samples collected from 556 ft AMSL. The distribution of chromium was similar except its peak concentration of 270 µg/L occurred at 546 ft AMSL.

The comparison of VAS groundwater screening results to Phase II monitoring well groundwater quality results in Section 5.0 concluded that the VAS sample results are biased high with respect to arsenic, calcium, iron, and manganese concentrations. The lead and chromium detections in VAS borehole samples represent false positive detections and are not representative of groundwater quality. Based on this review, and the data review provided in Section 4.0, CRA recommends no additional monitoring wells be installed at the WT101 well nest.

6.3 VAS 106-225

Figure 2.1 presents the location of Phase II borehole VAS106-225, south of the southeast corner of Site. CRA installed VAS106-50 and VAS106-150 to an elevation of 608 ft AMSL during the Phase I Groundwater Investigation (CRA, 2009) to investigate groundwater quality downgradient of the Site, particularly in the Intermediate Aquifer. There are no distinct contaminant migration pathways evident in the results from groundwater samples collected at VAS106-50 and VAS106-150. During the Phase II Groundwater Investigation, CRA installed new Intermediate Aquifer monitoring well WT106B adjacent to WT106A. VAS106-50, VAS106-150, VAS106-225, WT106A and WT106B are shown on Figure 3.5 (Cross Section C-C') and Figure 3.7 (Cross Section F-F'). Section 5.0 includes a discussion of the results from groundwater samples collected from WT106B.

CRA installed VAS106-225 southeast of the Site during the Phase II Groundwater Investigation. CRA used groundwater screening data from VAS106-225 to determine if groundwater contaminants are present in the Lower Aquifer southeast of the Site, if preferential contaminant migration pathways exist in the Lower Aquifer and if permanent Lower Aquifer monitoring wells are required at these locations.

Figure 6.3 provides a plot of the concentration of VOCs versus depth in groundwater samples collected from VAS106-225. The maximum VOC concentrations typically occurred in the shallow Phase I samples collected above an elevation of 720 ft AMSL. VOC concentrations decreased with depth and are typically less than 1 µg/L below an

elevation of 720 ft AMSL. This is consistent with trace (<1 µg/L) localized concentrations of VOCs present in the Upper and Intermediate Aquifers. With the exception of MEK at a concentration of 2.2 µg/L in the groundwater sample collected from 603 ft AMSL, the Lower Aquifer VOC concentrations are less than 1 µg/L. The VOC results from groundwater samples collected at VAS106-225 do not show evidence of any preferential contaminant migration pathways.

Figure 6.4 provides the concentrations of selected metals and sulfate versus depth in groundwater samples collected from VAS106-225. CRA collected Phase II VAS106-225 groundwater screening samples from an elevation of approximately 553 ft AMSL to 603 ft AMSL. Metals are present at concentrations less than 500 µg/L above approximately 600 ft AMSL. Maximum calcium (4,220 mg/L), manganese (1,990 µg/L), lead (573 µg/L), iron (814 mg/L), and chromium (5,190 µg/L) concentrations were detected in the groundwater sample collected from the Lower Aquifer at 553 ft AMSL.

The comparison of VAS groundwater screening results to Phase II monitoring well groundwater quality results in Section 5.0 concluded that the VAS samples results are biased high with respect to arsenic, calcium, iron, and manganese concentrations, and the lead and chromium detections in VAS borehole samples generally represent false positive detections and are not representative of groundwater quality. However, the concentrations of these parameters in the groundwater screening sample collected from 553 ft AMSL are among the highest observed during the Groundwater Investigation. Therefore, CRA recommends that new Lower Aquifer monitoring well WT106C be installed at an elevation of 550 ft AMSL to 555 ft AMSL. This corresponds to the maximum calcium and manganese concentrations in groundwater samples collected from VAS106-225. Groundwater quality data from samples collected from WT106C will verify VAS metals results are biased high and will determine if Site activities have impacted the Lower Aquifer south of the Site.

6.4 VAS115-175

Figure 2.1 presents the location of Phase II borehole VAS115-175. Groundwater samples collected from Upper Aquifer monitoring well WT115A contained benzene at concentrations that were greater than the Primary MCL of 5 µg/L. This is the only location at the Site where a VOC concentration in a groundwater sample collected from a monitoring well exceeded its Primary MCL. The groundwater samples collected from WT115A also contained metals that were greater than their Primary MCLs, albeit in turbid samples. CRA installed VAS borehole VAS115-175 adjacent to WT115A to an approximate depth of 175 ft (585 ft AMSL), which corresponds to the elevation of the

Unnamed Clay layer. The results for groundwater samples collected from VAS115-175 provide vertical delineation of benzene- and metals-impacted groundwater at this location in the Upper and Intermediate Aquifers. WT115A and VAS115-175 are shown on Figure 3.6 (Cross Section B-B') and Figure 3.7 (Cross Section E-E').

Figure 6.5 shows a plot of the concentration of VOCs with depth in groundwater samples collected from VAS115-175. Benzene concentrations peak at 18 µg/L in the groundwater sample collected at 737 ft AMSL. Carbon disulfide concentrations peak at 19 µg/L in the groundwater sample collected at 727 ft AMSL. The peak 1,1-DCA concentration of 7.5 µg/L occurred in the groundwater sample collected at 717 ft AMSL. The concentrations of these three VOCs decrease with depth and the concentrations of all three VOCs are less than 2 µg/L in samples below the groundwater sample collected from 697 ft AMSL. Other VOCs were detected in the groundwater samples collected from VAS115-175, but no VOCs were detected at concentrations greater than 2 µg/L.

Figure 6.6 illustrates the concentrations of selected metals and sulfate with depth in groundwater samples collected from VAS115-175. The highest calcium concentrations were 461 mg/L and 464 mg/L from samples collected at 737 ft AMSL and 727 ft AMSL, respectively. There were no other obvious peak concentrations.

The analytical data for groundwater samples collected from VAS115-175 delineate benzene concentrations in the vicinity of WT115A in the Upper and Intermediate Aquifers. CRA recommends that the PSDs install new Upper Aquifer monitoring well WT115B to be screened at a depth corresponding to the peak benzene concentration in the groundwater sample (737 ft AMSL). This also corresponds to the second highest calcium concentration in groundwater samples collected from VAS115-175. Proposed monitoring well WT115B will serve as a detection monitoring well for the peak benzene concentration observed in groundwater samples collected from the Site. Carbon disulfide and 1,1-DCA peak at slightly different elevations than benzene at this location, but neither of these VOCs has an MCL. CRA also recommends that the PSDs install new Intermediate Aquifer monitoring well WT115C at an elevation of 695 ft AMSL to 700 ft AMSL. WT115C will be used to monitor the vertical limits of the benzene plume present in the Upper Aquifer at WT115B. Existing monitoring well WT115A should remain in the Interim Groundwater Monitoring Program pending the interpretation of the results of groundwater sampling from the proposed monitoring wells WT115B and WT115C.

6.5 VAS121-225

CRA installed VAS121-225 southeast of the Site during the Phase II Groundwater Investigation at the location shown on Figure 2.1. There are no monitoring wells at this location. CRA used groundwater screening data from VAS121-225 to determine if groundwater contaminants are present in the Lower Aquifer southeast of the Site, if preferential contaminant migration pathways exist in the Lower Aquifer, and if permanent Lower Aquifer monitoring wells are required at these locations. The stratigraphy in this vicinity is shown on Figure 3.7 (Cross Section C-C').

Figure 6.7 illustrates the concentrations of VOCs with depth in groundwater samples collected from VAS121-225. Carbon disulfide was detected in some of the groundwater samples collected from VAS121-225, with a peak concentration of 14 µg/L detected in the groundwater sample collected at 573 ft AMSL. Methylethylketone (MEK) was detected in groundwater samples collected from VAS121-225 at concentrations up to 5.8 µg/L. Other VOCs in groundwater samples collected from VAS121-225 were typically detected at concentrations less than 1 µg/L. Based on the VOC data for groundwater samples collected from VAS121-225, there are no other obvious peak concentrations or preferential groundwater migration pathways in the vicinity of VAS121-225.

Figure 6.8 provides the concentration of selected metals and sulfate versus depth in groundwater samples collected from VAS121-225. Calcium concentrations peak at 3,410 mg/L in the groundwater sample collected at 703 ft AMSL. Manganese, iron, lead, and arsenic also peak in the groundwater sample collected at 703 ft AMSL. A secondary metals peak occurs in the groundwater samples collected from the Lower Aquifer at 553 ft AMSL.

In Section 3.0, CRA recommended installing Upper Aquifer monitoring well WT121A at the location of VAS121-225 to delineate Upper Aquifer groundwater flow southeast of the Site. There are no distinct peaks in VOC concentrations with depth and relatively low overall concentrations in the groundwater samples collected from VAS121-225. The comparison of VAS groundwater screening results to the Phase II monitoring well groundwater quality results in Section 5.0 concluded the VAS samples results are biased high with respect to arsenic, calcium, iron, and manganese concentrations, and the lead and chromium detections in VAS borehole samples typically represent false positive detections and are not representative of groundwater quality. However, the concentrations of these parameters in the sample collected from 703 ft AMSL are among the highest observed during the Groundwater Investigation. Therefore, CRA recommends installing monitoring well WT121B at the primary peak metals

concentration at 703 ft AMSL to verify that VAS metals results are biased high and to determine if Site activities have impacted the Intermediate Aquifer south of the Site.

7.0 CONCLUSIONS AND PHASE III GROUNDWATER INVESTIGATION SCOPE OF WORK

7.1 CONCLUSIONS

The Phase I Groundwater Investigation was designed to further the characterization of the hydrogeological conditions and groundwater quality beneath the Site. The Phase II Groundwater Investigation has addressed data gaps identified during the Phase I Groundwater Investigation. The main conclusions of the Groundwater Investigations are summarized below.

Hydrogeology

The Unnamed Silt/Clay Layer separates the Intermediate Aquifer from the Lower Aquifer and is continuous beneath the southeast corner of the Site and southeast of the Site. The Lower Aquifer is composed mainly of fine sand and is approximately 30 feet thick beneath the southeast corner of the Site and south east of the Site. Blue green shale underlies the overburden sequence at an elevation that ranges from 536 ft AMSL to 541 ft AMSL. Groundwater flows south-southeasterly beneath the Site, consistent with the regional groundwater flow pattern.

Groundwater Quality Monitoring

There is a benzene plume of limited horizontal and vertical extent in the Upper Aquifer in the vicinity of on-Site monitoring well WT115A. There is limited groundwater impact from the landfill around the perimeter of the landfill. The pattern of widespread, low-concentration 1,1-DCA, cis-1,2-DCE, vinyl chloride, and carbon disulfide detections along the southern Site boundary is consistent with residual contamination undergoing degradation in the absence of ongoing contaminant loading. Bis(2-Ethylhexyl)phthalate was detected intermittently in groundwater samples that were widely dispersed, both laterally and vertically, both upgradient and down gradient of the Site and typically at low concentrations. This suggests that bis(2-Ethylhexyl)phthalate may not be completely, if at all, attributable to Site activities.

There are rare, widespread and inconsistent detections of lead and arsenic at concentrations greater than the Primary MCLs/Action Level in groundwater samples collected south of the Site.

The BVs for iron, manganese, calcium and sulfate in the Upper Aquifer are all greater than their respective Secondary MCLs and/or RDAs. Groundwater sample

concentrations greater than the Upper Aquifer BVs for iron, manganese and calcium are restricted to the Site. There were no groundwater samples containing sulfate at concentrations that exceeded the Upper Aquifer BV for sulfate.

The BVs for iron, manganese, and sulfate in the Intermediate Aquifer are all greater than their respective Secondary MCLs and/or RDAs. Iron concentrations in groundwater samples collected from two Intermediate Aquifer monitoring wells, located east and south of the Site, were greater than the Upper Aquifer iron BV of 1,870 µg/L. The manganese concentration in a groundwater sample collected from one of the off-Site Intermediate Aquifer monitoring wells located east of the Site was greater than the BV of 173 µg/L for manganese. The Intermediate Aquifer BV (86 mg/L) for calcium is less than the RDA (250 mg/L). Calcium concentrations in groundwater samples collected from Intermediate Aquifer monitoring wells located along the southern portion of the Site and south of the Site exceeded the BV, but not the RDA. Sulfate concentrations in groundwater samples collected from Intermediate Aquifer monitoring wells located in the southwest corner of the Site exceeded the Secondary MCL of 250 mg/L, but none of the sample concentrations exceeded the Intermediate Aquifer BV of 430 mg/L for sulfate.

The Lower Aquifer BVs for iron and manganese are greater than the Secondary MCLs and/or RDA. Iron and manganese concentrations in groundwater samples collected from the Lower Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program round were less than their respective BVs. Calcium and sulfate concentrations in groundwater samples collected from the Lower Aquifer monitoring wells during the Q7 Interim Groundwater Monitoring Program were less than their RDA and Secondary MCL, respectively.

VAS

The VOC results for the Phase II VAS groundwater screening samples are characterized by widespread VOCs at low concentrations. This is not consistent with a distinct plume of VOCs emanating from the Site.

Several metals detected in the Phase II VAS groundwater screening samples had widespread, almost universal, exceedances of their respective criteria (Primary MCLs, Secondary MCLs, or RDAs). The VAS sample results are biased high with respect to arsenic, calcium, iron, and manganese concentrations, likely as a result of elevated sample turbidity. Lead and chromium detections in VAS borehole samples typically represent false positive detections and are not representative of groundwater quality.

Based on the conclusions above, and the assessment provided in this report, CRA recommends installing additional monitoring wells during the Phase III Groundwater Investigation. Section 7.3 presents CRA's rationale for the additional monitoring wells.

7.2 DATA GAP ANALYSIS

The Phase I Groundwater Investigation (CRA, 2009) identified several principal data gaps. The data gaps and steps taken to address these data gaps are described below.

Data Gap No. 1 - Additional investigative activities are required to confirm the thickness and lateral extent of the Unnamed Silt/Clay Layer.

The stratigraphic data from Phase II boreholes VAS101-225, VAS106-225, and VAS121-225 have fully addressed the data gap with respect to the stratigraphy southeast of the Site. The stratigraphic data from Phase II VAS boreholes confirm that the Unnamed Silt/Clay Layer is continuous beneath the southeast corner of the Site and southeast of the Site.

Data Gap No. 2 - There is a lack of high quality stratigraphic information from the deeper strata at the Site and in particular the Unnamed Silt/Clay Layer and the Lower Aquifer.

The stratigraphic data from Phase II boreholes VAS101-225, VAS106-225, and VAS121-225 have addressed the data gap with respect to the stratigraphy of the Lower Aquifer southeast of the Site. The Lower Aquifer underlies the Unnamed Silt/Clay Layer beneath the southeast corner of the Site and southeast of the Site. The Lower Aquifer occupies the interval between approximately 570 ft AMSL and 540 ft AMSL, and consists primarily of fine brown sand.

Data Gap No. 3 - There is a general lack of monitoring wells in the Upper Aquifer along the eastern Site boundary and east of the Site that makes interpretation of groundwater flow directions east of the Site difficult.

CRA installed Phase II monitoring well WTO2 along the eastern Site boundary to address the lack of Upper Aquifer monitoring wells in the area. While this has improved the delineation of groundwater flow east of the Site, additional monitoring wells are required to fully address this data gap. Section 7.3 provides CRA's recommendations for additional Phase III monitoring wells.

Data Gap No. 4 - The distribution of Intermediate and Deep Aquifer monitoring wells is similarly lacking in monitoring wells east of the Site. There are also gaps in the Intermediate and Deep Aquifer monitoring well network south of the Site.

CRA installed Phase II Intermediate Aquifer monitoring well WT106B south of the southeastern corner of the Site. CRA proposed to install Intermediate Aquifer monitoring wells WT105B and WT105C south of the Site; however, as of October 2010 the property owner has withheld access to his land. The Trust is continuing to negotiate access to an area north of the original proposed location for WT105B and WT105C (where the wells will be part of a new WT122 well nest). One additional Phase III monitoring well is required to fully address the gap in the Lower Aquifer monitoring well network south of the Site. Section 7.3 provides CRA's recommendations for additional Phase III monitoring wells.

Data Gap No. 5- The Phase I Groundwater Investigation (CRA, 2009) indicated that a data gap exists with respect to background groundwater quality data.

Groundwater samples were collected during the course of the Interim Groundwater Monitoring Program in order to have at least 8 data points available to calculate the BVs. In June 2010, prior to the Q7 Interim Groundwater Monitoring Program round, the owner of the properties where the background monitoring well nest (WT102A, WT102B and WT102C) is located denied access to the wells. Although CRA previously identified the BVs as preliminary, no additional data can be collected until access to the background wells is secured. CRA will recalculate the BVs, as appropriate, if more data become available, and will include the results in subsequent groundwater investigation reports.

7.3 PHASE IIIGROUNDWATER INVESTIGATION SCOPE OF WORK

The objectives of the groundwater investigations, as stated in Section 1.2 and previous reports, are to:

i) Delineate the horizontal and vertical extent of groundwater impact from the landfill around the perimeter of the landfill

ii) Delineate 1,2-dichloropropane detected in a sample from the residential well at 54305 Westwood Drive, immediately east of the Site

iii) Delineate an appropriate buffer zone east of the Site

iv) Delineate groundwater contaminants that may have migrated south of the Site

v) Provide information required to design an appropriate monitoring well network

The Phase I and Phase II Groundwater Investigations have met these objectives through historic data compilation, VAS, new monitoring well installations, routine monitoring, and detailed review of the data set.

The results of the groundwater quality monitoring at the WT114 monitoring well nest indicate that there is no plume of VOCs in excess of primary MCLs in the vicinity of 54305 Westwood Drive. CRA recommends routine groundwater monitoring to confirm the groundwater quality results for groundwater samples collected from the WT114 monitoring well nest.

Some additional investigation is required to complete the delineation of impact to groundwater from the landfill, complete the delineation of contaminants south and southeast of the Site, and confirm groundwater flow direction southeast of the Site.

CRA recommends installing the following monitoring wells during the Phase III Groundwater Investigation:

Well Name	*Screen Interval (ft AMSL)*	*Aquifer*	*Rationale*
WT106C	550 - 555	Lower Aquifer	Maximum metals concentration
WT115B	735 - 740	Upper Aquifer	Maximum benzene concentration
WT115C	695 - 700	Intermediate Aquifer	Sentry monitoring well
WT120C	745 - 750	Upper Aquifer	Delineate groundwater flow
WT121A	735 - 740	Upper Aquifer	Delineate groundwater flow
WT121B	696 - 701	Intermediate Aquifer	Maximum metals concentration

These proposed monitoring wells will provide groundwater quality data with respect to the presence of VOCs in groundwater beneath the Site, and groundwater quality data with respect to metals concentrations in potential preferential migration pathways identified by the Phase II VAS results. The relatively low VOC concentrations, and the potential high bias for metals results suggest that groundwater samples collected from these proposed wells will confirm very limited off-Site migration of Site-related compounds. If there is limited impairment of groundwater quality in the vicinity of the proposed wells, some of the proposed wells are well placed to serve as sentinel wells south of the Site. The following is the detailed rationale for the proposed Phase III monitoring wells. The locations of the proposed wells are shown on Figure 7.1. The proposed wells are also depicted on cross sections provided on Figures 7.2 through 7.5. The cross section locations are shown on Figure 3.2.

7.3.1 UPPER AQUIFER

CRA recommends installing two new Upper Aquifer monitoring wells to improve the definition of groundwater flow directions in the Upper Aquifer east and southeast of the Site. This will fully address the data gap identified during the Phase I Groundwater Investigation. As shown on Figure 7.1, Upper Aquifer monitoring well WT121A will be installed at the location of VAS121, located southeast of the Site, and Upper Aquifer monitoring well WT120C will be installed at the location of well nest WT120.

The data for groundwater samples collected from VAS115-175 delineate benzene in the vicinity of WT115A in the Upper and Intermediate Aquifers. CRA recommends installing new Upper Aquifer monitoring well WT115B to monitor the interval of the peak benzene concentration detected in the VAS115-175 sample collected at 737 ft AMSL. Figure 7.1 shows the location of proposed Upper Aquifer monitoring well WT115B. Figure 7.2 (Cross Section B-B') and Figure 7.4 (Cross Section F-F') show the proposed elevation of the WT115B well screen (735 ft AMSL to 740 ft AMSL). Proposed monitoring well WT115B will serve as a detection monitoring well for the peak benzene concentration observed in groundwater samples collected from the Site.

7.3.2 INTERMEDIATE AQUIFER

CRA recommends installing new Intermediate Aquifer monitoring well WT115C to monitor the vertical limits of the benzene plume present in the Upper Aquifer at WT115B. Figure 7.1 shows the location of proposed Intermediate Aquifer monitoring well WT115C. Figure 7.2 (Cross Section B-B') and Figure 7.4 (Cross Section F-F') show the proposed elevation of the WT115C well screen (695 ft AMSL to 700 ft AMSL). Proposed monitoring well WT115C will be a sentinel monitoring well to delineate the vertical extent of benzene in the vicinity of the WT115 well nest.

There are no distinct peaks in VOC concentrations with depth and relatively low overall VOC concentrations in the groundwater samples collected from VAS121-225. As discussed in Section 6.0, the VAS samples results are biased high with respect to metals concentrations, and are not typically representative of groundwater quality. However, since the metals detected in a sample from VAS121-225 are among the highest detected during the Groundwater Investigations, CRA recommends installing monitoring well WT121B at the primary peak metals concentration at 703 ft AMSL to verify that VAS metals results are biased high, and to determine if Site activities have impacted the Intermediate Aquifer south of the Site. Figure 7.1 shows the location of proposed

Intermediate Aquifer monitoring well WT121B. Figure 7.3 (Cross Section C-C') and Figure 7.5 (Cross Section G-G') show the proposed elevation of the WT121B well screen (696 ft AMSL to 701 ft AMSL).

7.3.2 LOWER AQUIFER

The concentrations of arsenic, calcium, iron, and manganese in the groundwater screening sample collected from 553 ft AMSL in Phase II borehole VAS106-225 are among the highest observed during the Groundwater Investigation. CRA recommends that the Trust install new Lower Aquifer monitoring well WT106C south of the Site. Figure 7.1 shows the location of proposed Lower Aquifer monitoring well WT106C. Figure 7.3 (Cross Section C-C') and Figure 7.4 (Cross Section F-F') show the proposed elevation of the WT106C well screen (550 ft AMSL to 555 ft AMSL). This corresponds to the maximum calcium and manganese concentrations in groundwater samples collected from VAS106-225. Groundwater quality data from samples collected from WT106C will verify VAS metals results are biased high and determine if Site activities have impacted the Lower Aquifer south of the Site.

7.4 INTERIM GROUNDWATER MONITORING PROGRAM

CRA collected the eighth round of quarterly monitoring for the Interim Groundwater Monitoring Program in September 2010. The PSDs will submit a report to USEPA that provides the results of the Q8 Interim Groundwater Monitoring Program round and a rationalization of the groundwater monitoring program, including the scope, frequency and parameters for future groundwater monitoring.

Following installation and development, the Phase III monitoring wells will be included in the Groundwater Monitoring Program.

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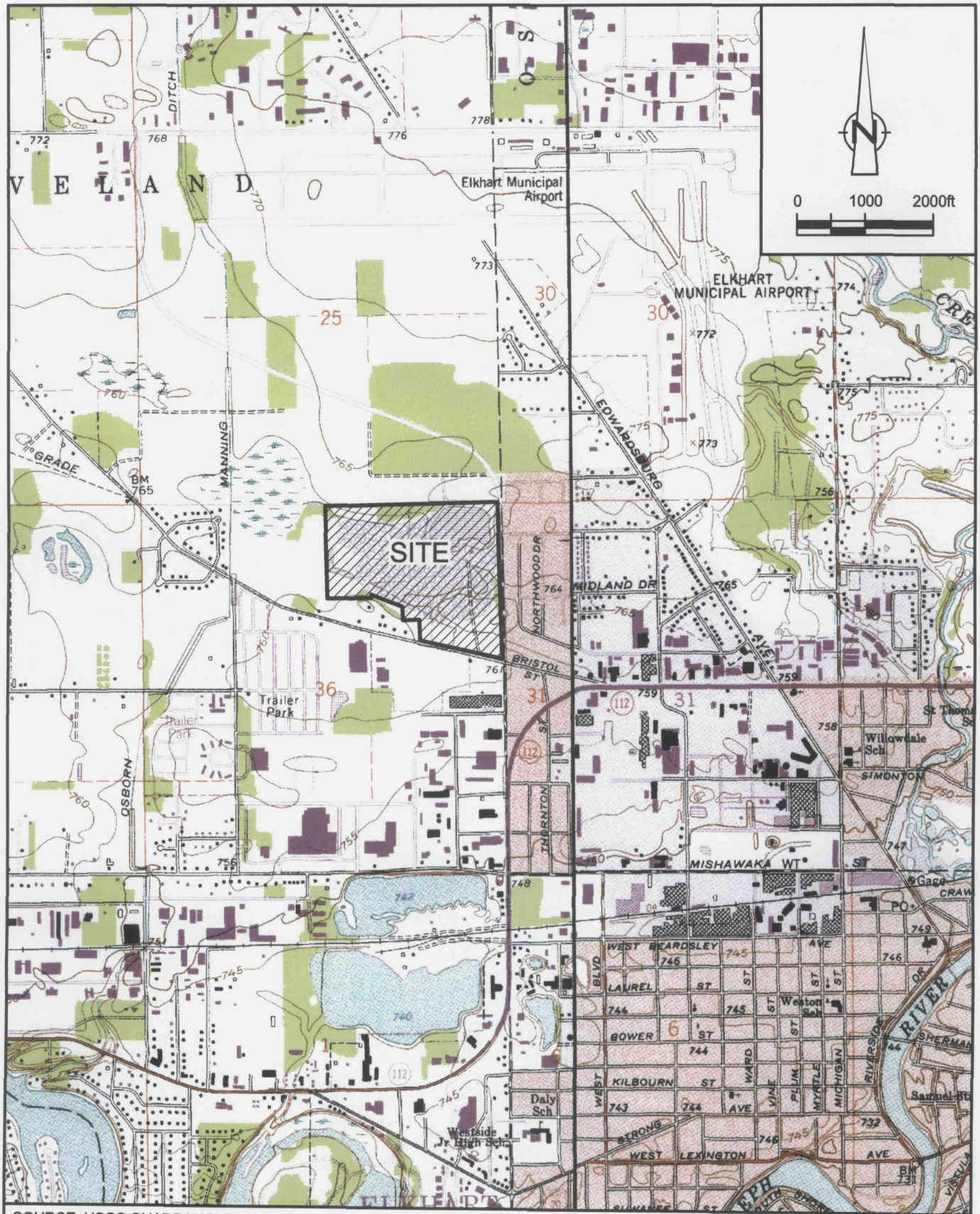
FIGURES



SOURCE: USGS QUADRANGLE MAPS;
ELKHART AND OSCEOLA, INDIANA

figure 1.1

SITE LOCATION MAP
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA035 OCT 27/2010

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

0 100 300ft

NOTE:
RESIDENTIAL BUILDINGS ALONG WESTWOOD DRIVE ARE APPROXIMATE AND WERE TAKEN FROM AN AIR PHOTO PLAN (HIMCO PRP WATER EXTENSION) DATED MAY, 12 2005

LEGEND

- SITE BOUNDARY
- PROPERTY BOUNDARY
- FENCE LINE
- POND
- HISTORIC POND
- PAVED ROAD
- UNPAVED ROAD
- LANDFILL LIMITS-2009 (APPROXIMATE)
- 760 TOPOGRAPHIC CONTOUR (5' INTERVAL)
- 759 TOPOGRAPHIC CONTOUR (1' INTERVAL)
- APPROXIMATE CONSTRUCTION DEBRIS AREA BASED ON 1992 LANDFILL LIMITS
- WT115A MONITORING WELL LOCATION
- WTN1 ABANDONED MONITORING WELL LOCATION
- SW1 SURFACE WATER LOCATION
- RW-01 RESIDENTIAL WELL LOCATION (APPROXIMATE)
- WT117C PHASE II MONITORING WELL LOCATION

figure 1.2

SITE PLAN
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA036 OCT 27/2010

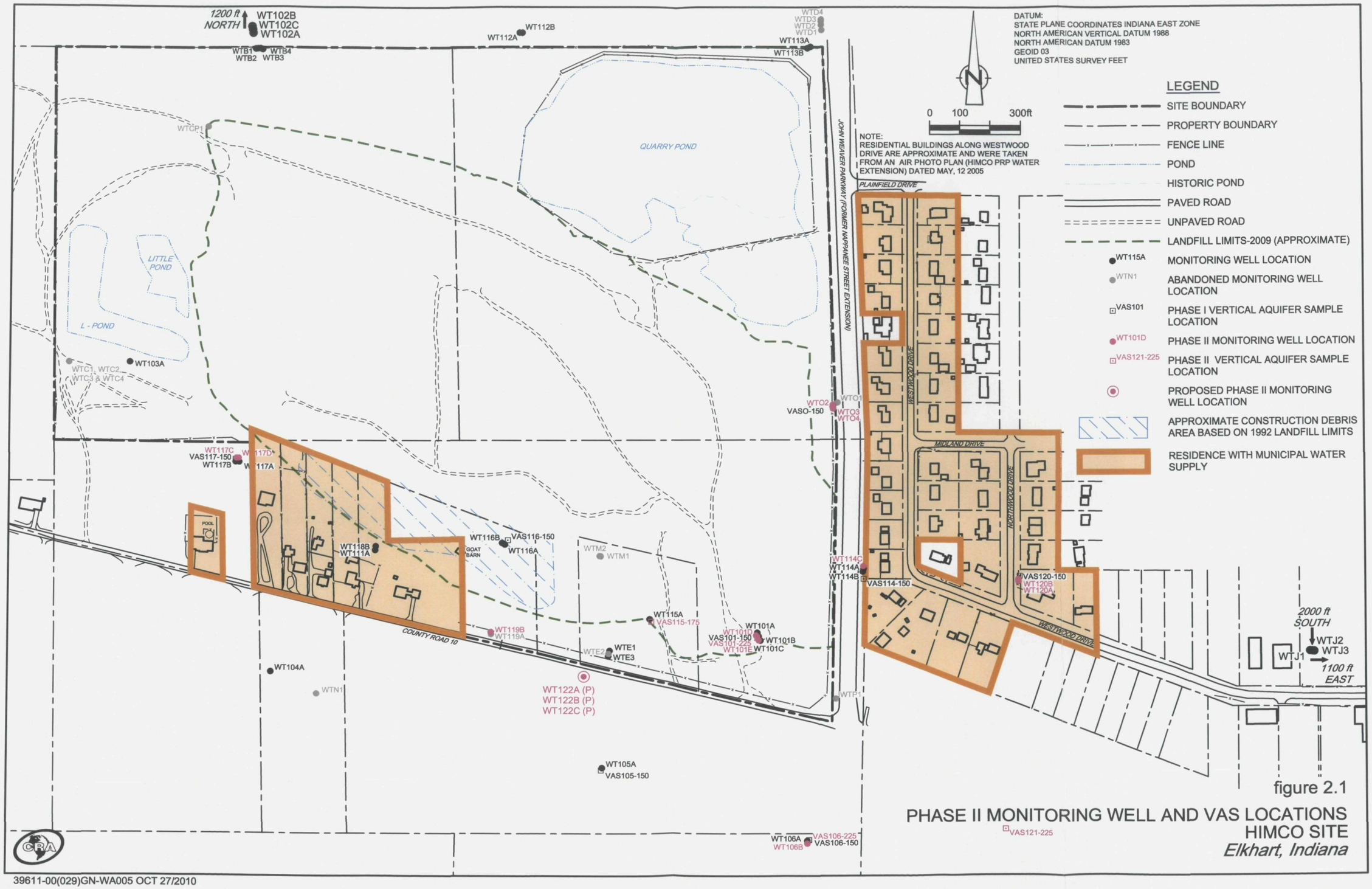


figure 2.1

PHASE II MONITORING WELL AND VAS LOCATIONS
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA005 OCT 27/2010

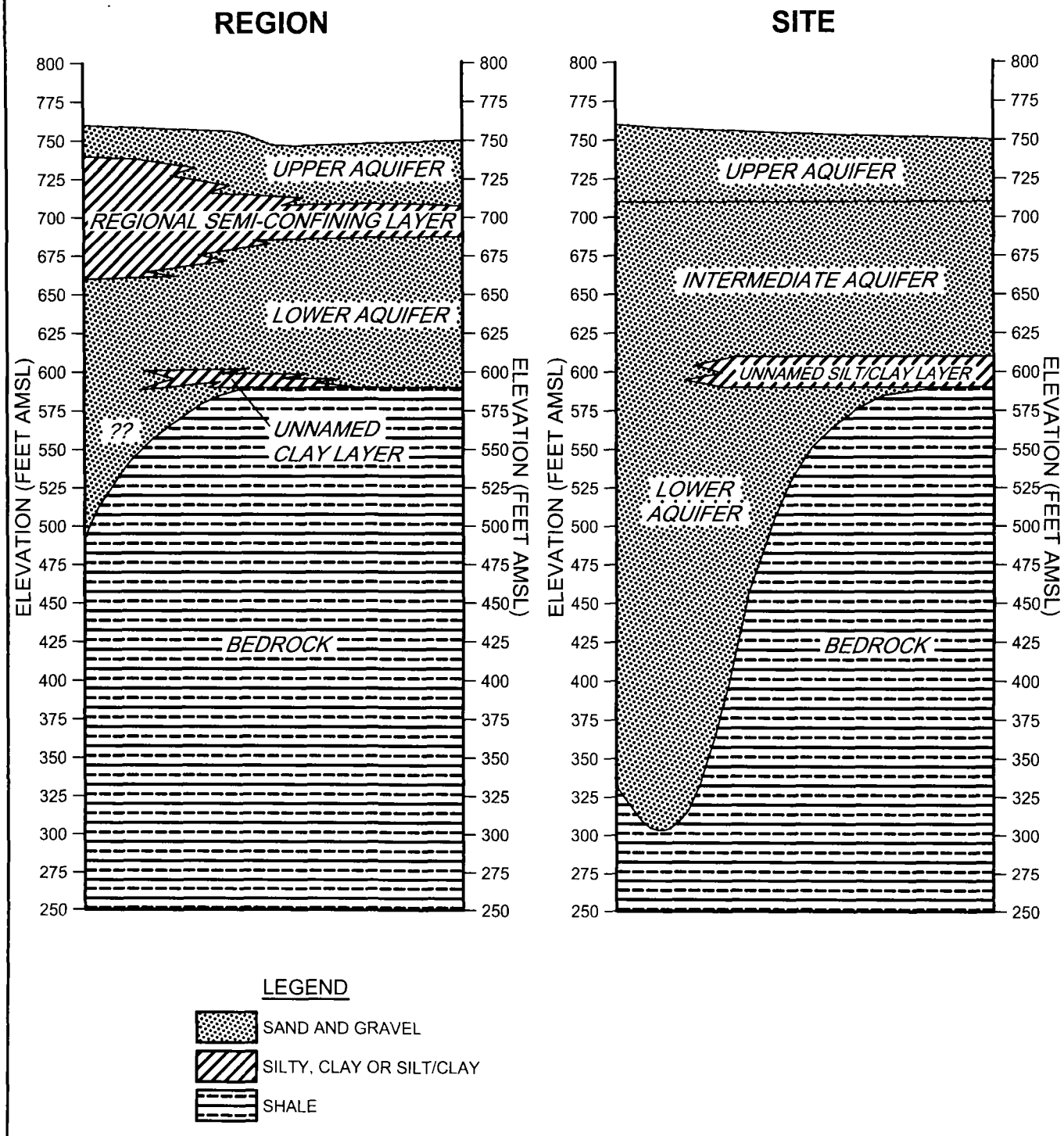


figure 3.1

SCHEMATIC CROSS-SECTION
HIMCO SITE
Elkhart, Indiana

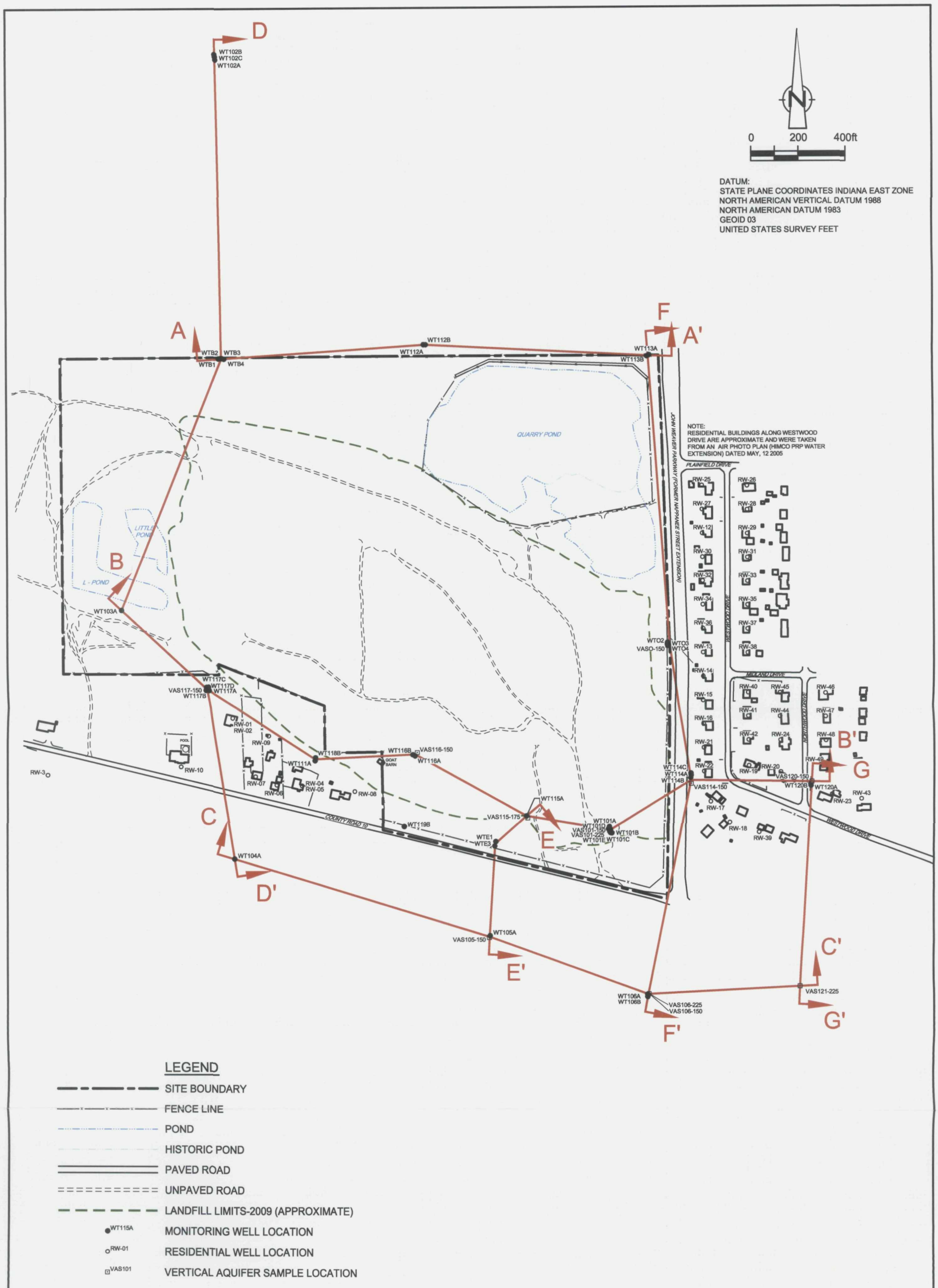


figure 3.2

CROSS SECTION LOCATIONS
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA004 OCT 27/2010

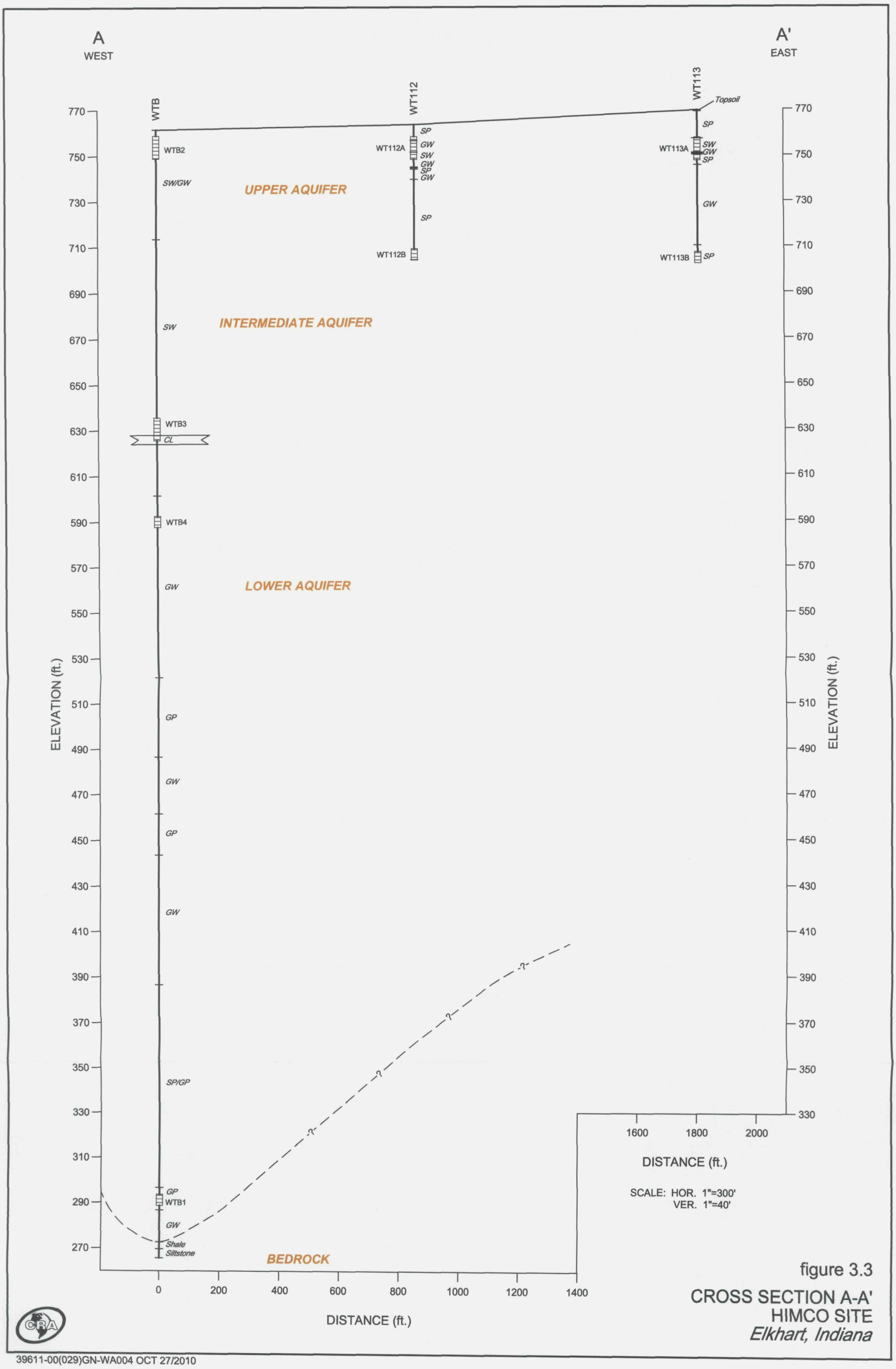


figure 3.3

CROSS SECTION A-A'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA004 OCT 27/2010

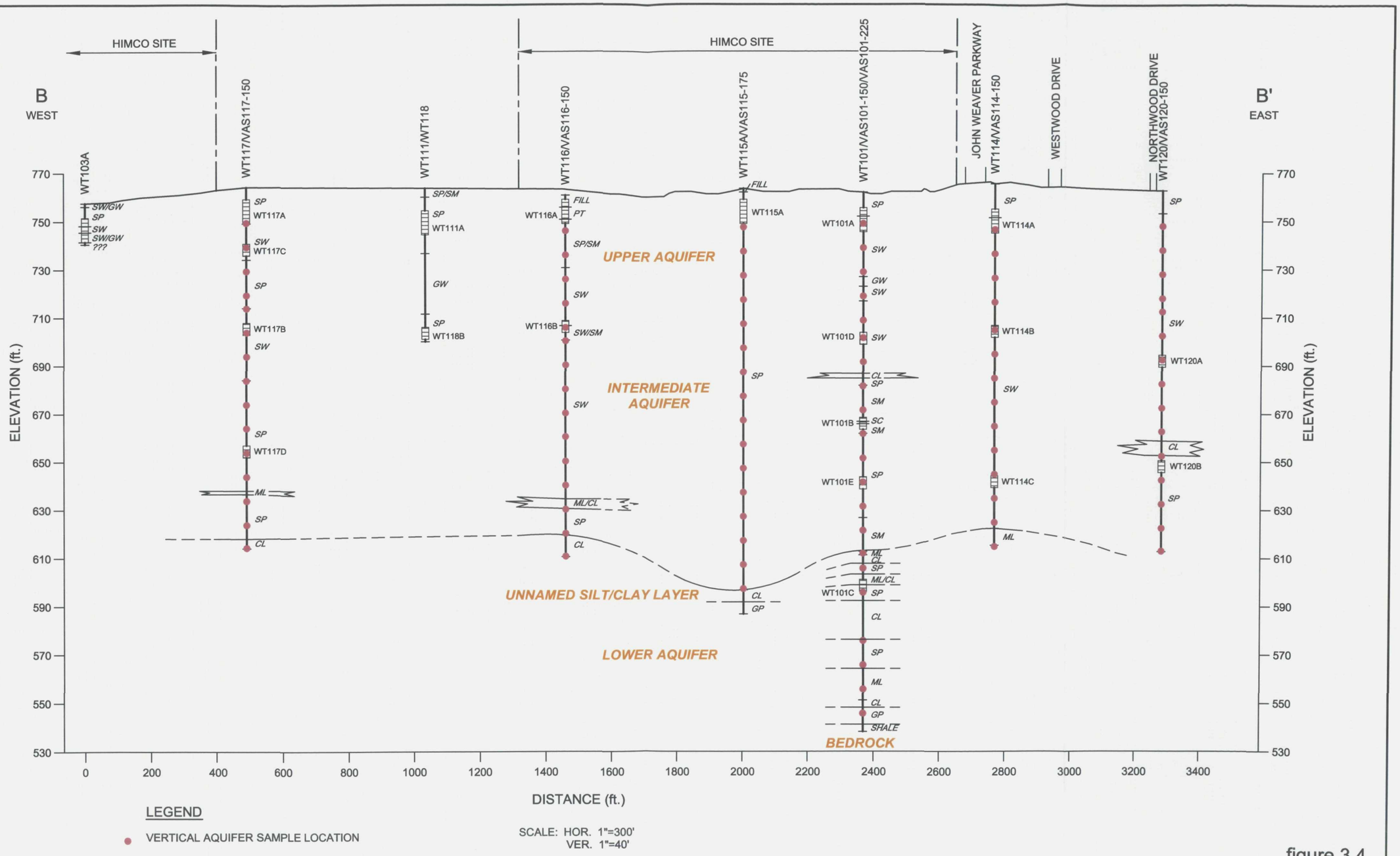


figure 3.4

CROSS SECTION B-B'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA004 OCT 27/2010

C
WEST

C'
EAST

WT104A
WT105/VAS105-150
WT106/VAS106-150/VAS106-225
VAS121-225

OL/SM
SP
WT106A
WT106B
GP/SP
SW
GW
GP
SM
CL
ML
CI
CL/ML
ML/CL
ML/SP
SHALE

UPPER AQUIFER
INTERMEDIATE AQUIFER
UNNAMED SILT/CLAY LAYER
LOWER AQUIFER
BEDROCK

ELEVATION (ft.)
770
750
730
710
690
670
650
630
610
590
570
550
530

0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600

DISTANCE (ft.)

LEGEND
- VERTICAL AQUIFER SAMPLE LOCATION

SCALE: HOR. 1"=300'
VER. 1"=40'

figure 3.5
CROSS SECTION C-C'
HIMCO SITE
Elkhart, Indiana

CRA

39611-00(029)GN-WA004 OCT 27/2010

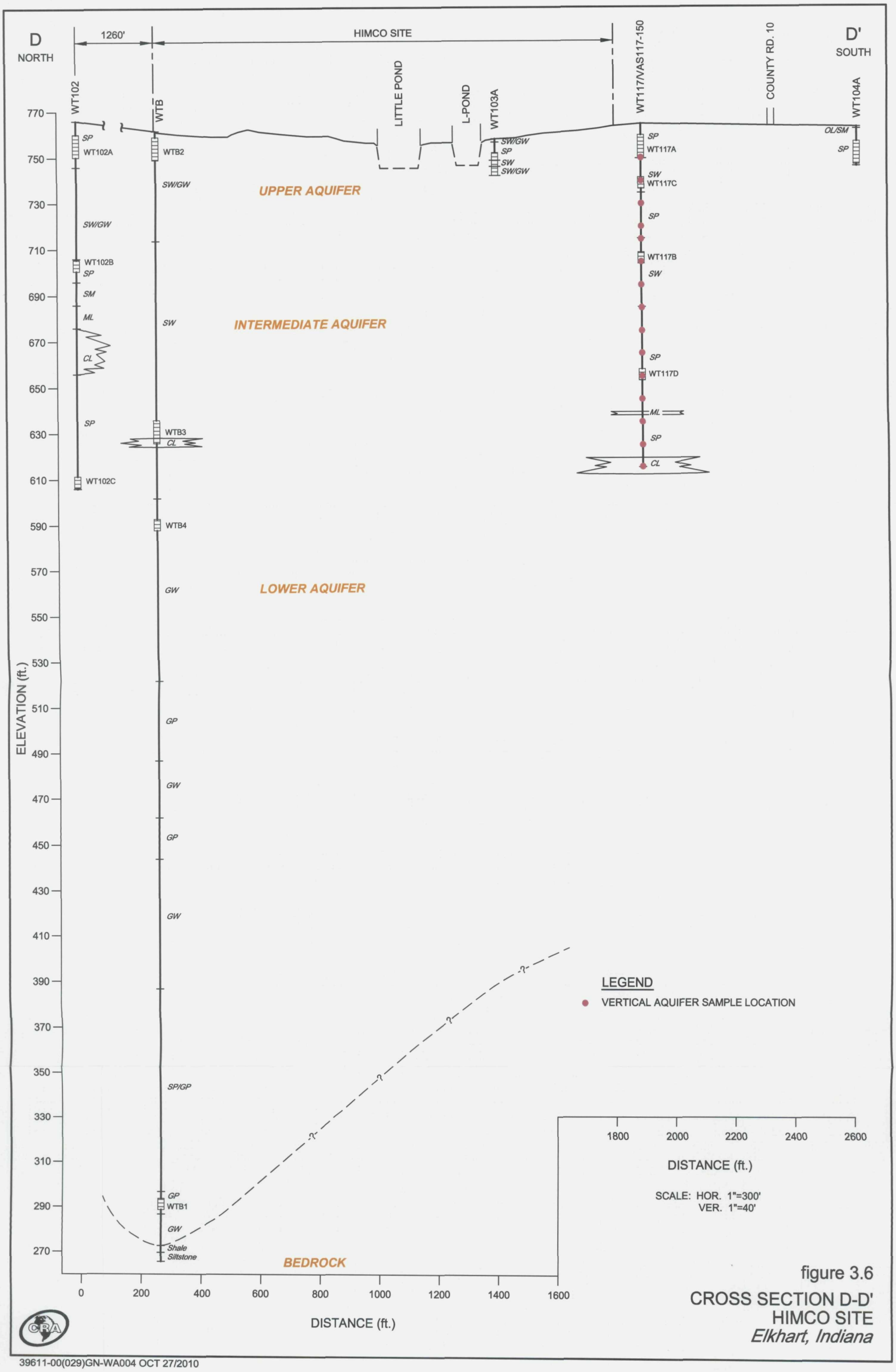


figure 3.6

CROSS SECTION D-D'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA004 OCT 27/2010

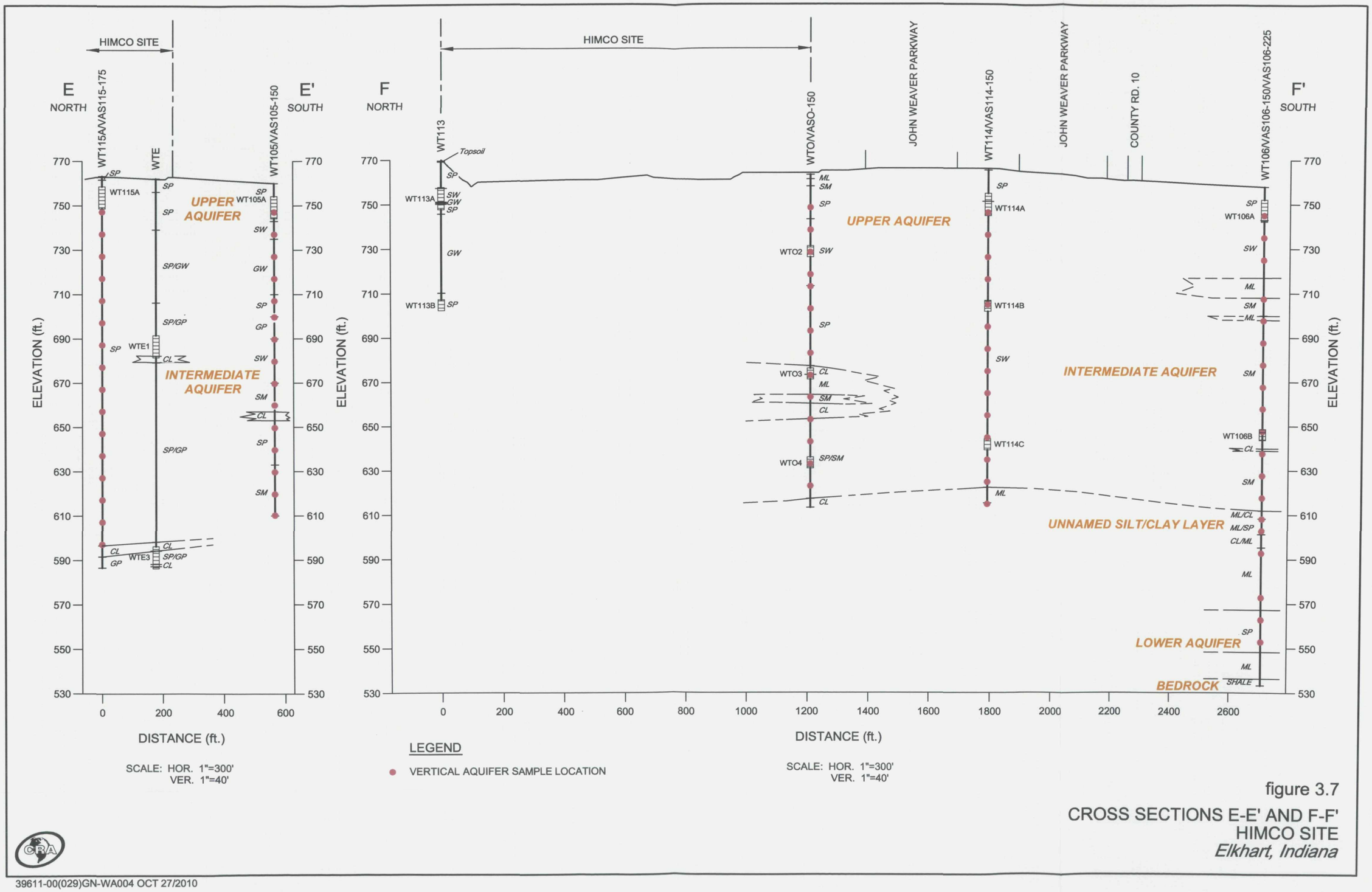
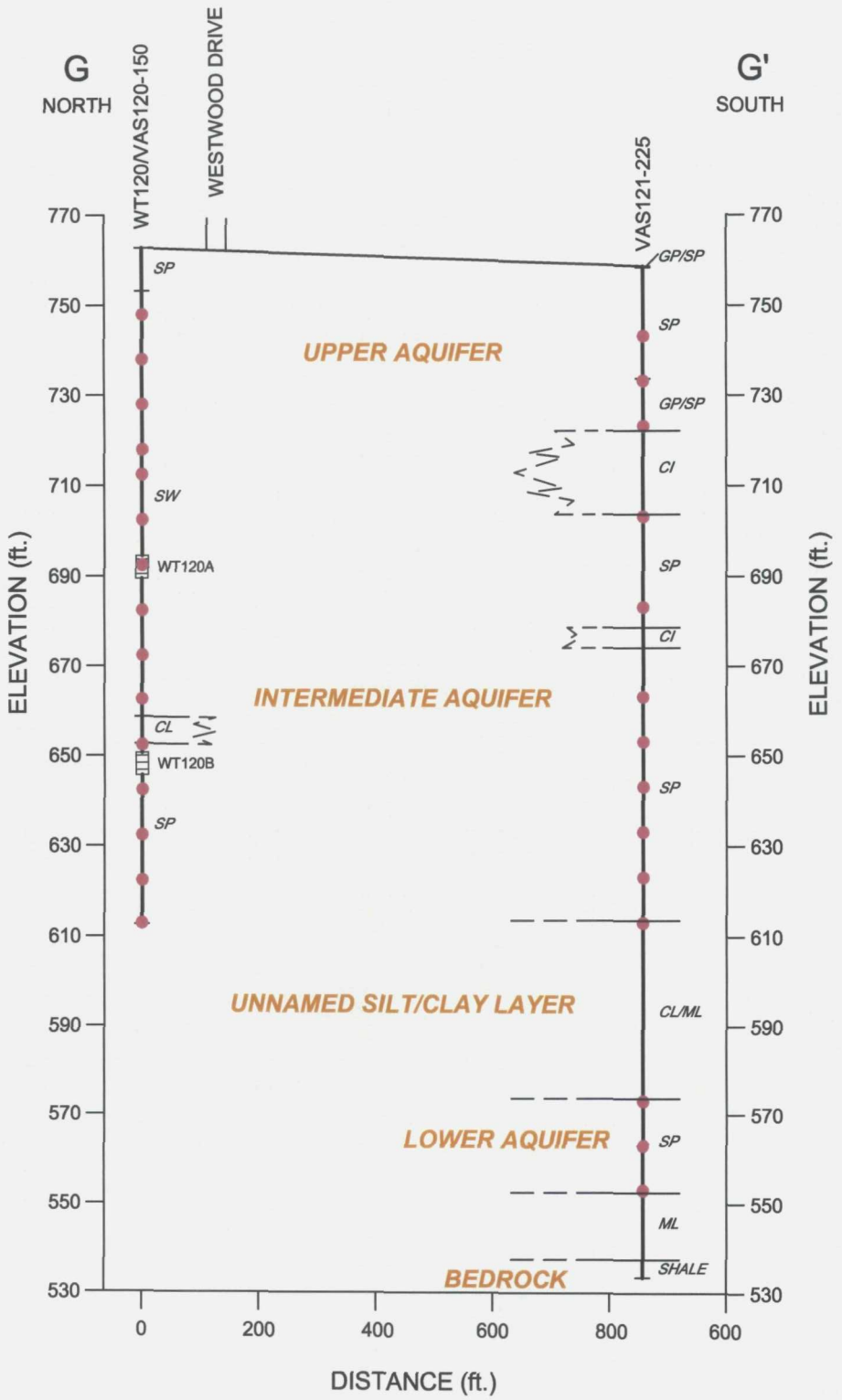


figure 3.7

CROSS SECTIONS E-E' AND F-F'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA004 OCT 27/2010



SCALE: HOR. 1"=300'
VER. 1"=40'

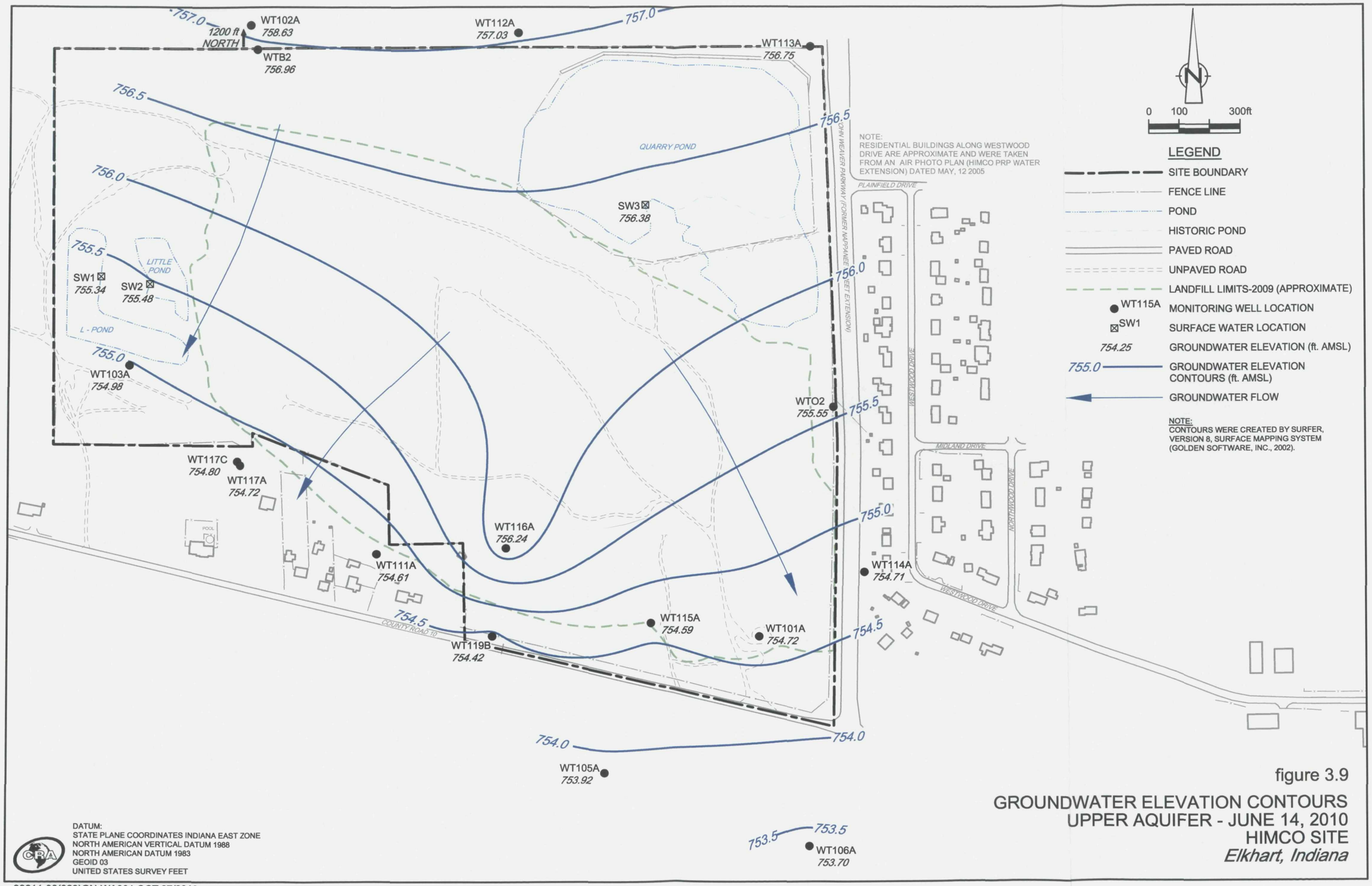
figure 3.8

CROSS SECTION G-G'
HIMCO SITE
Elkhart, Indiana

LEGEND

- VERTICAL AQUIFER SAMPLE LOCATION

39611-00(029)GN-WA004 OCT 27/2010

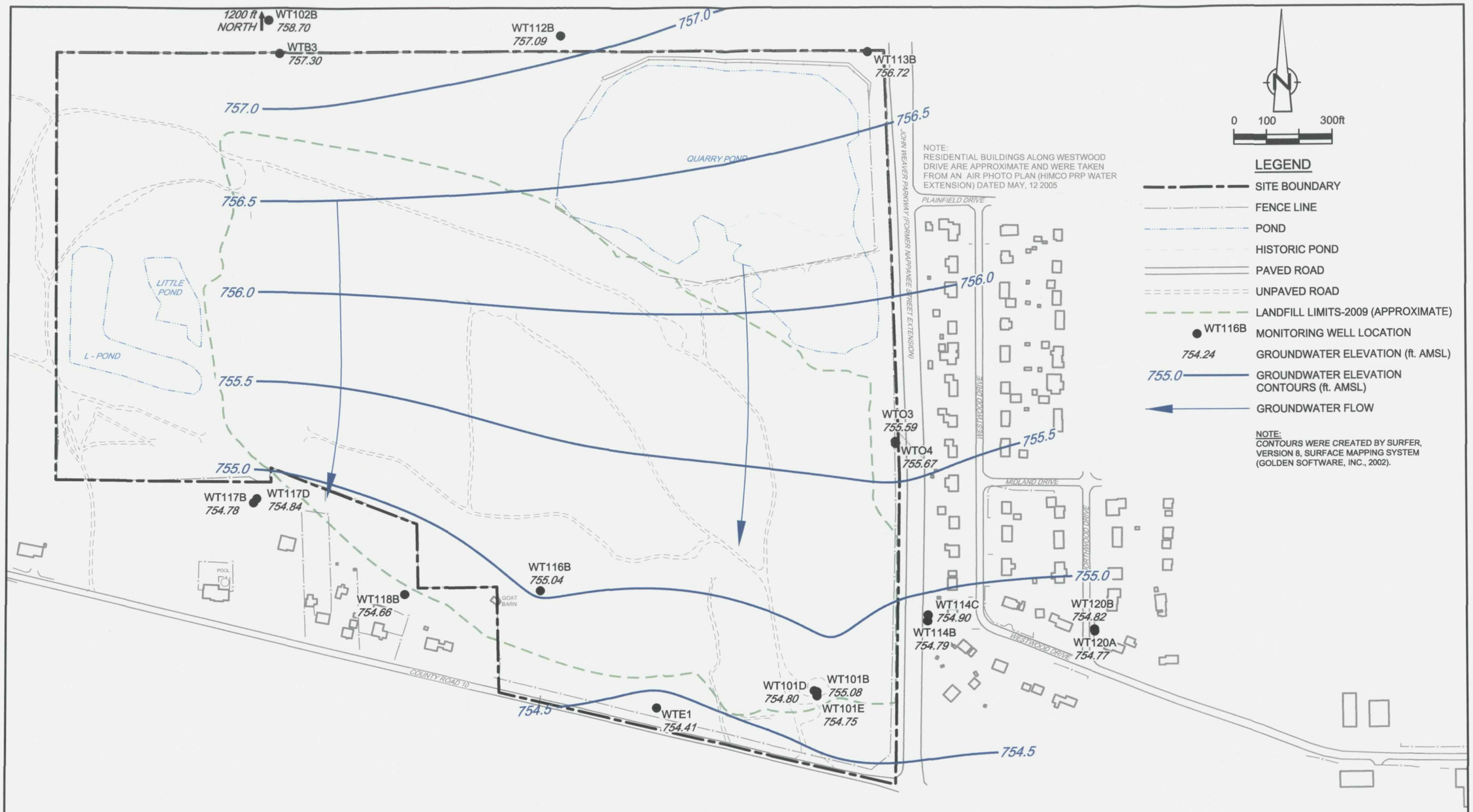


DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 3.9

GROUNDWATER ELEVATION CONTOURS
UPPER AQUIFER - JUNE 14, 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA001 OCT 27/2010

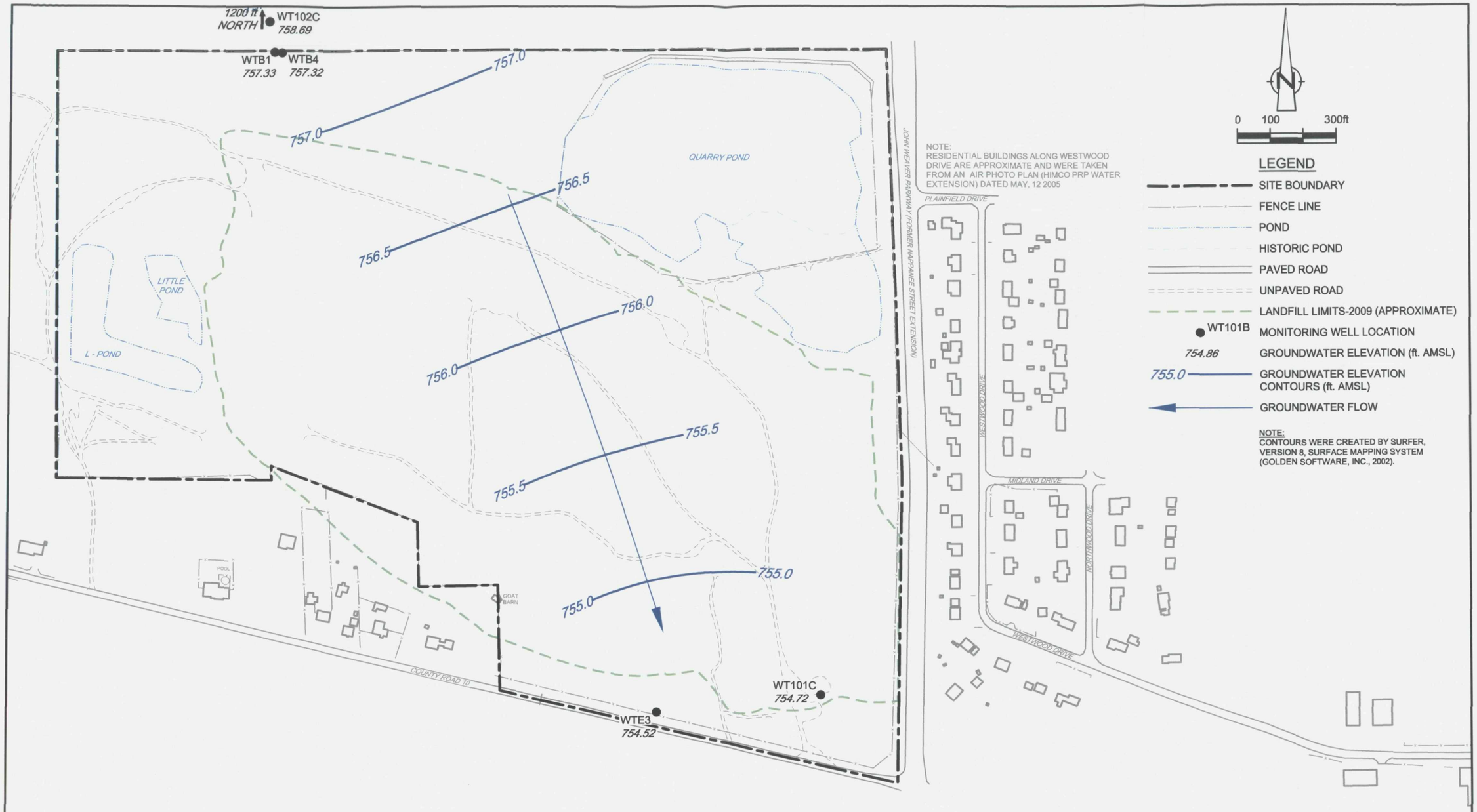


DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 3.10

GROUNDWATER ELEVATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 14, 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA002 OCT 27/2010



DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 3.11

GROUNDWATER ELEVATION CONTOURS
LOWER AQUIFER - JUNE 14, 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA003 OCT 27/2010

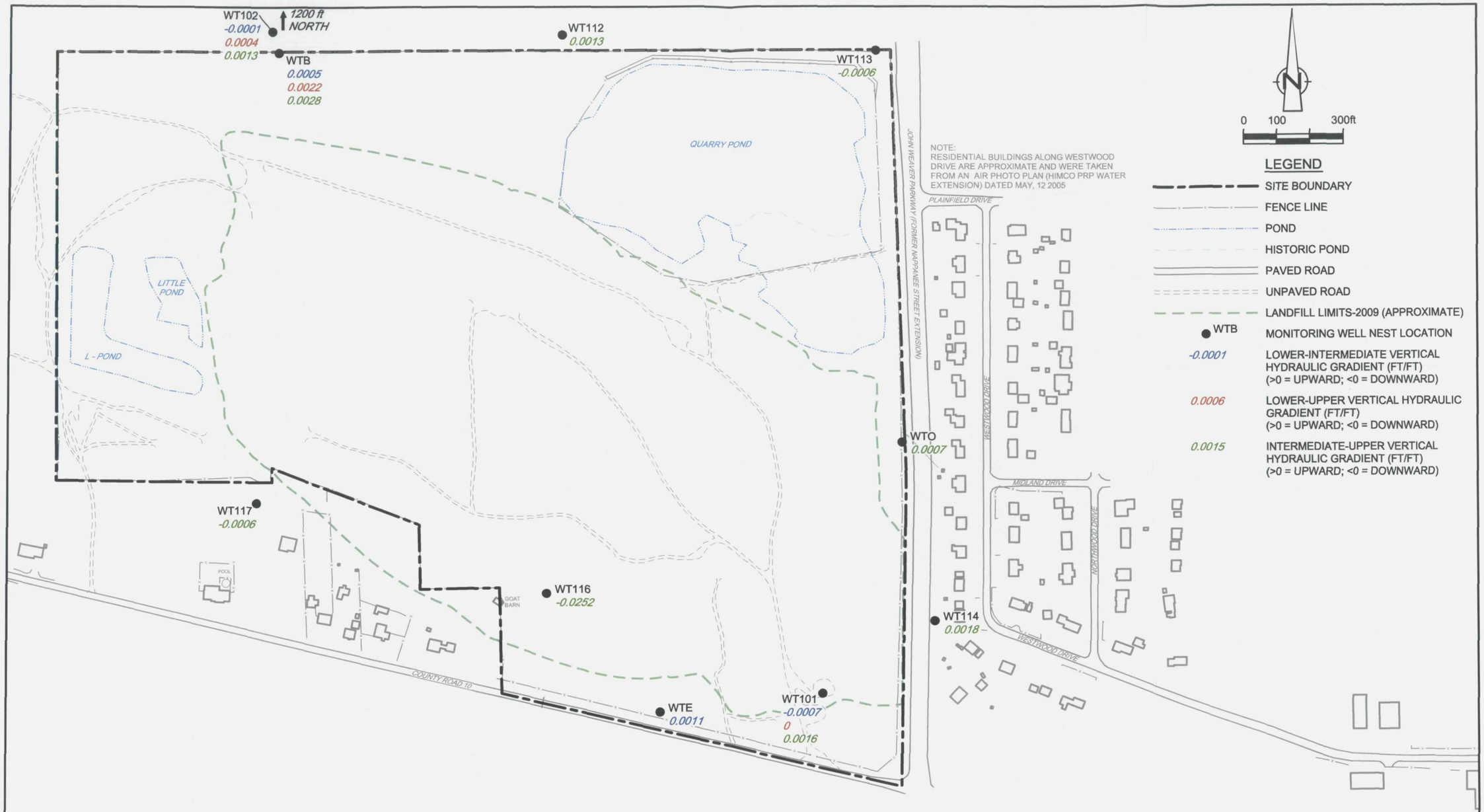


figure 3.12

VERTICAL HYDRAULIC GRADIENT
JUNE 14, 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA006 OCT 27/2010

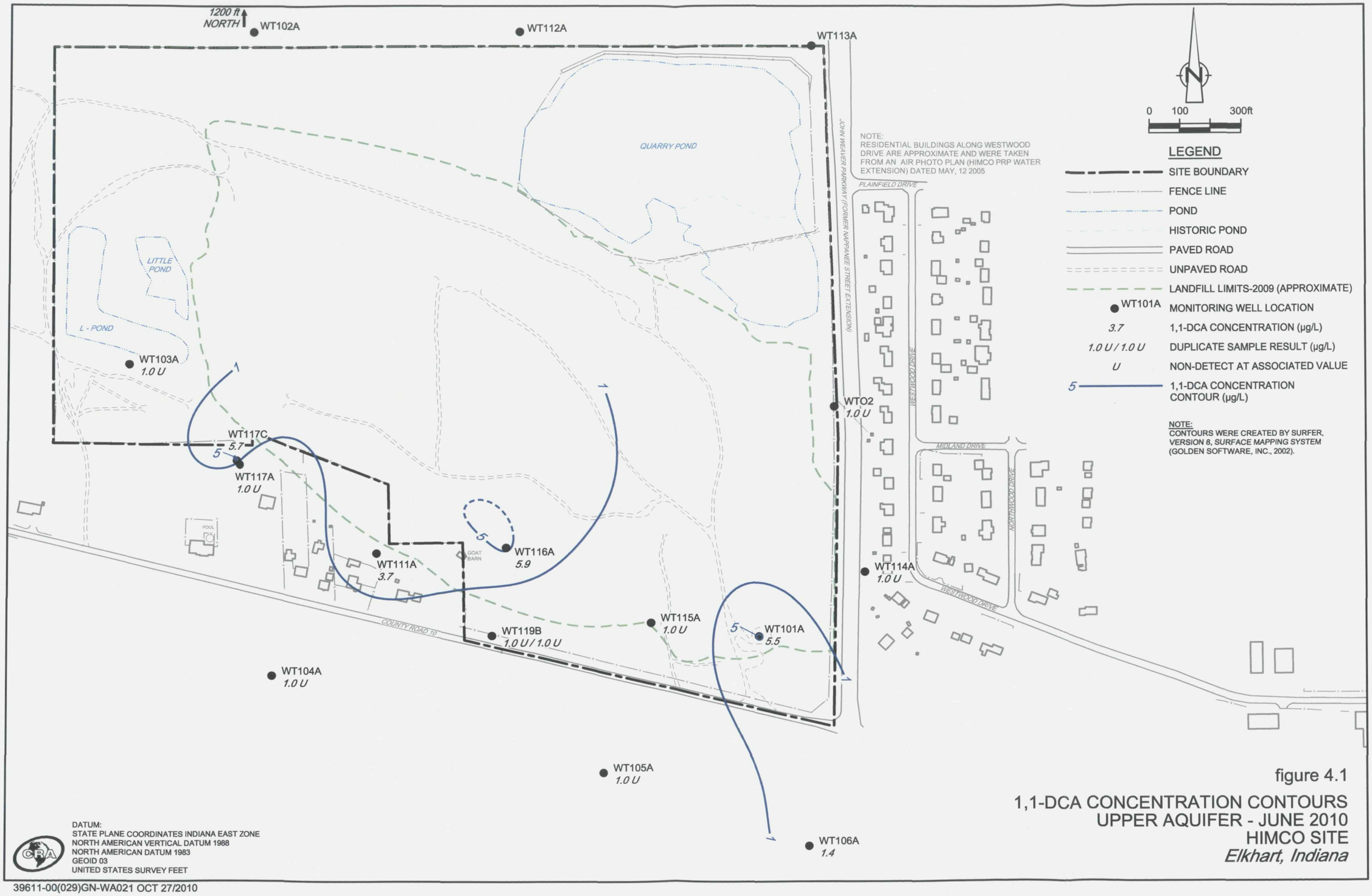


figure 4.1

1,1-DCA CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA021 OCT 27/2010

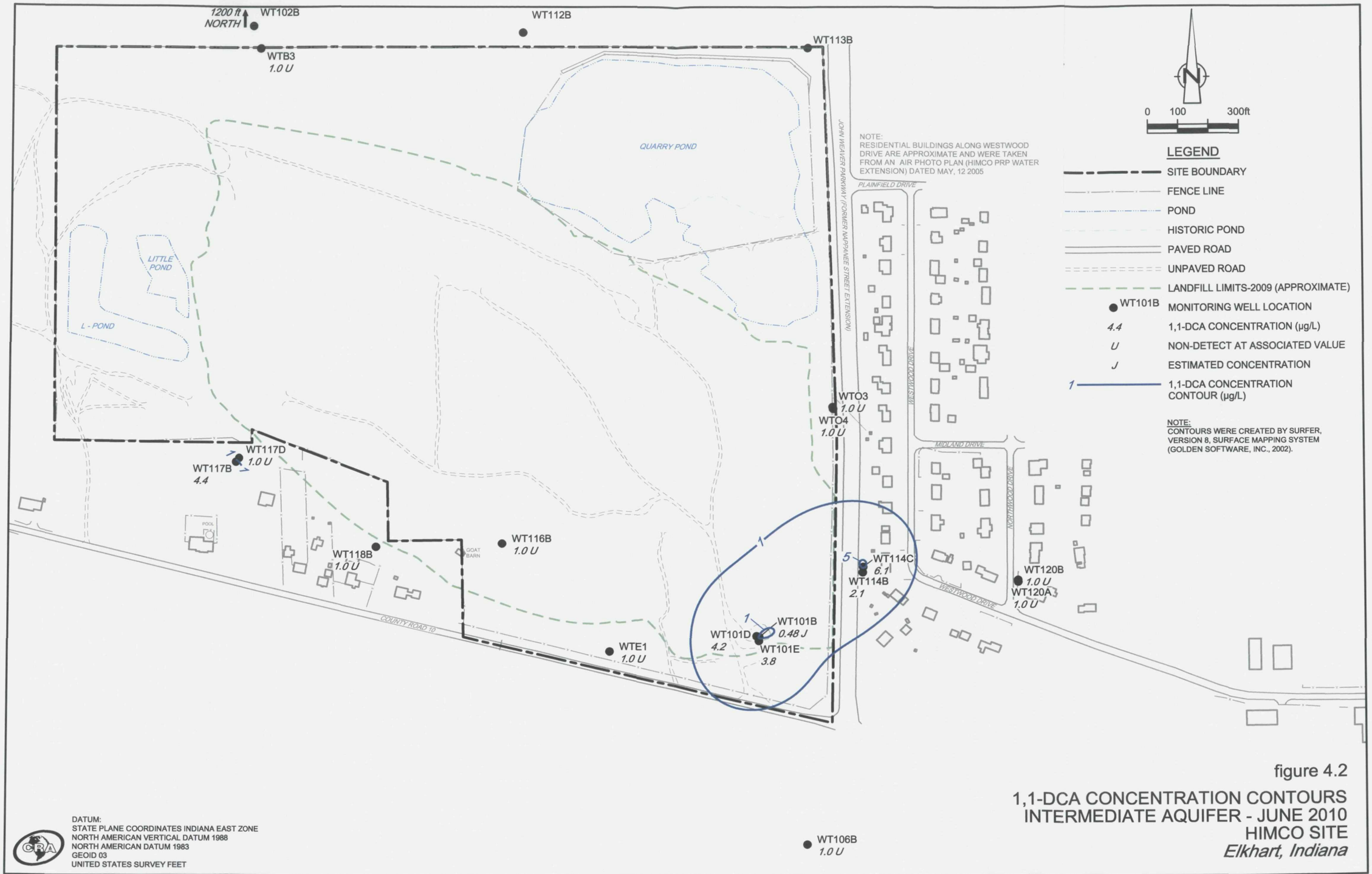
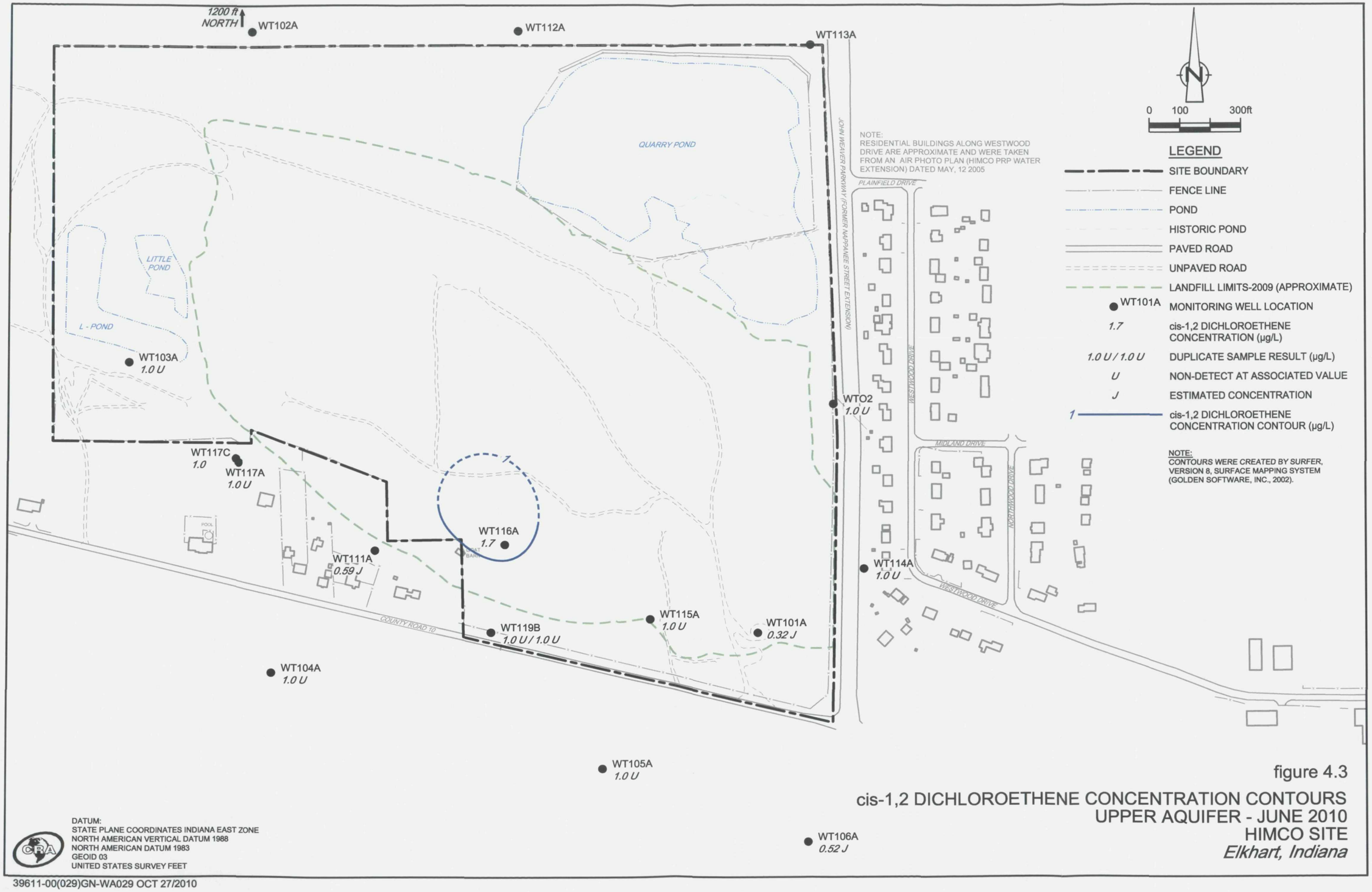


figure 4.2

1,1-DCA CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA022 OCT 27/2010



DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA029 OCT 27/2010

figure 4.3

cis-1,2 DICHLOROETHENE CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

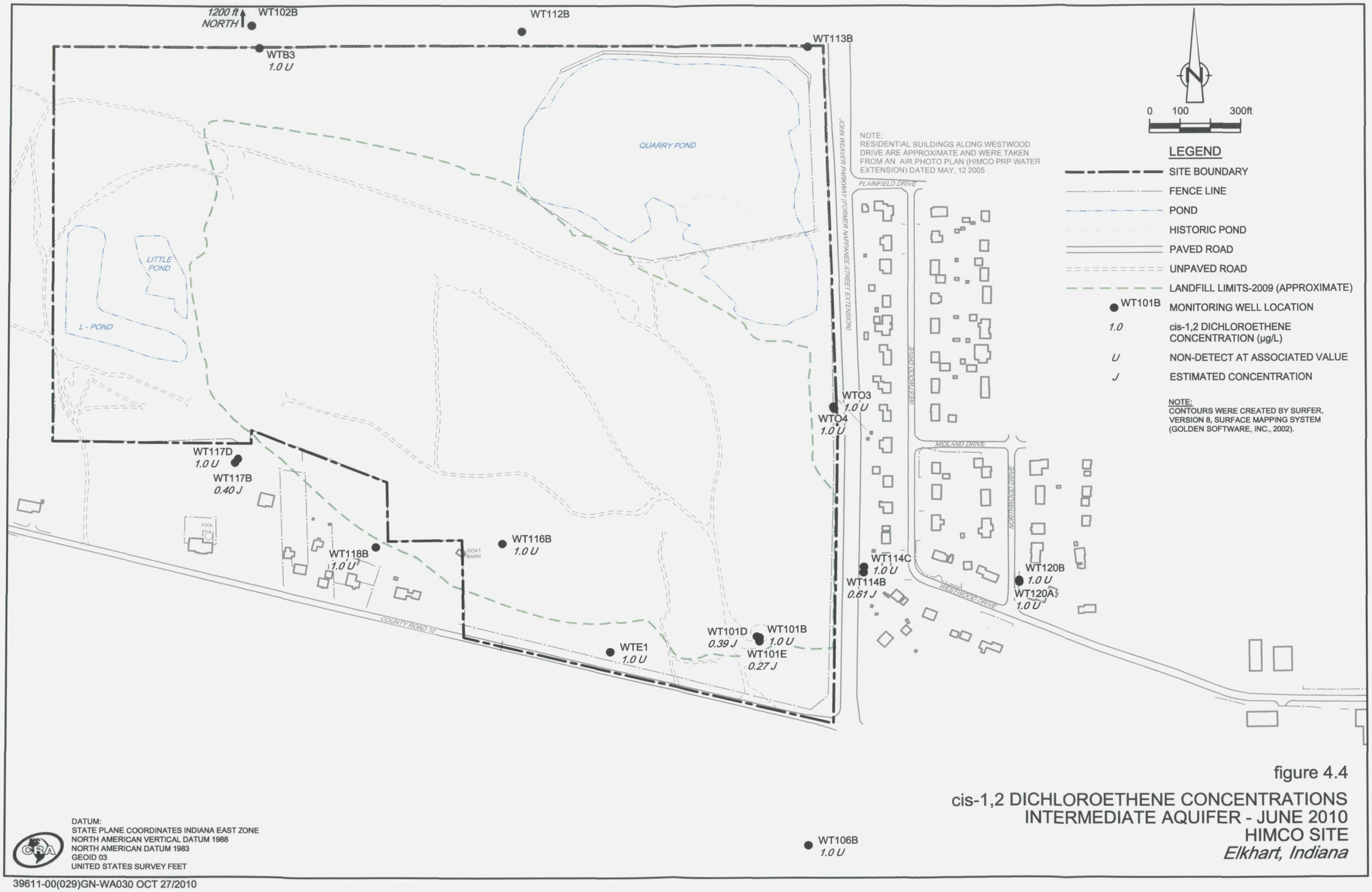


figure 4.4

cis-1,2 DICHLOROETHENE CONCENTRATIONS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA030 OCT 27/2010

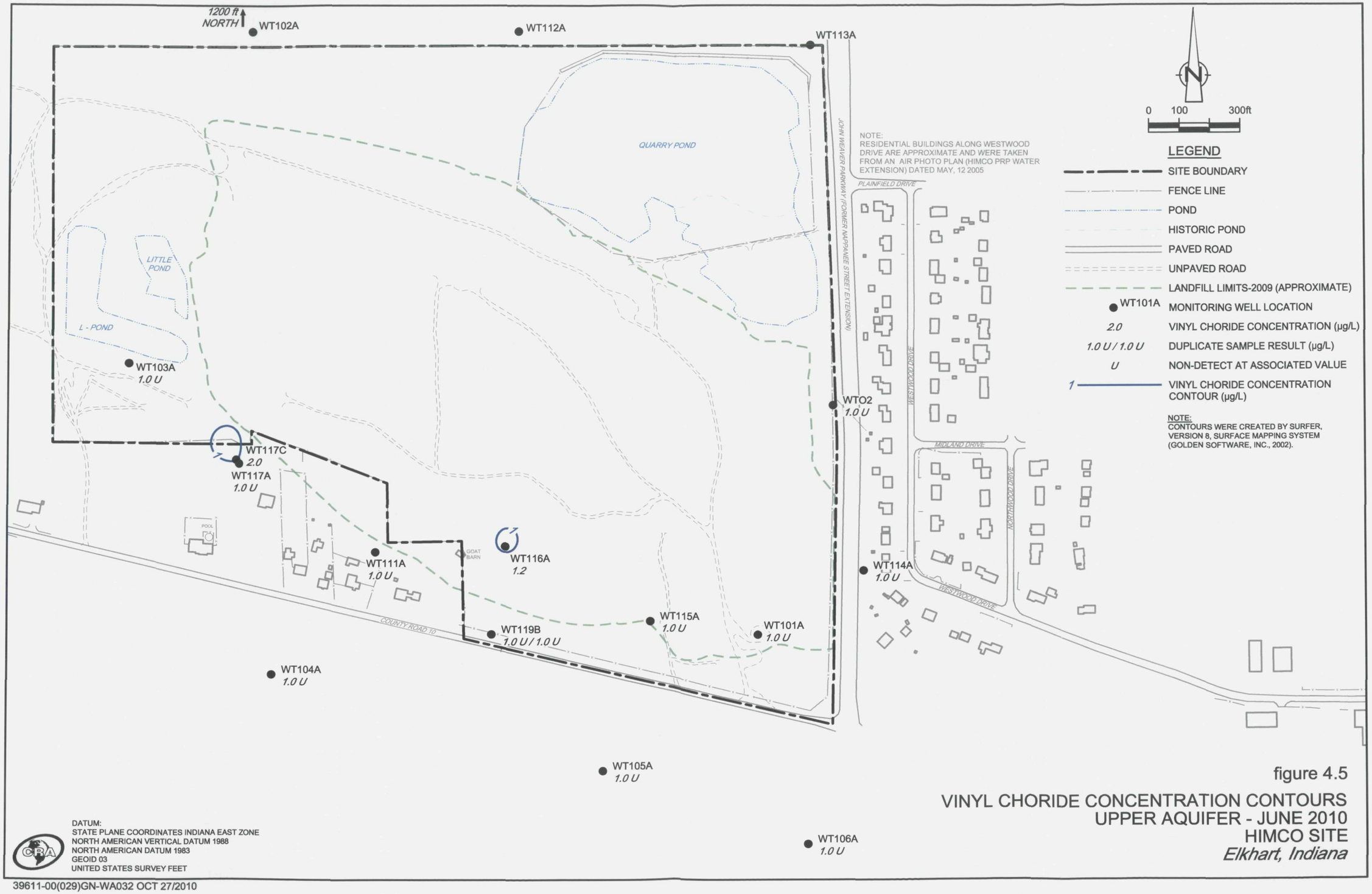
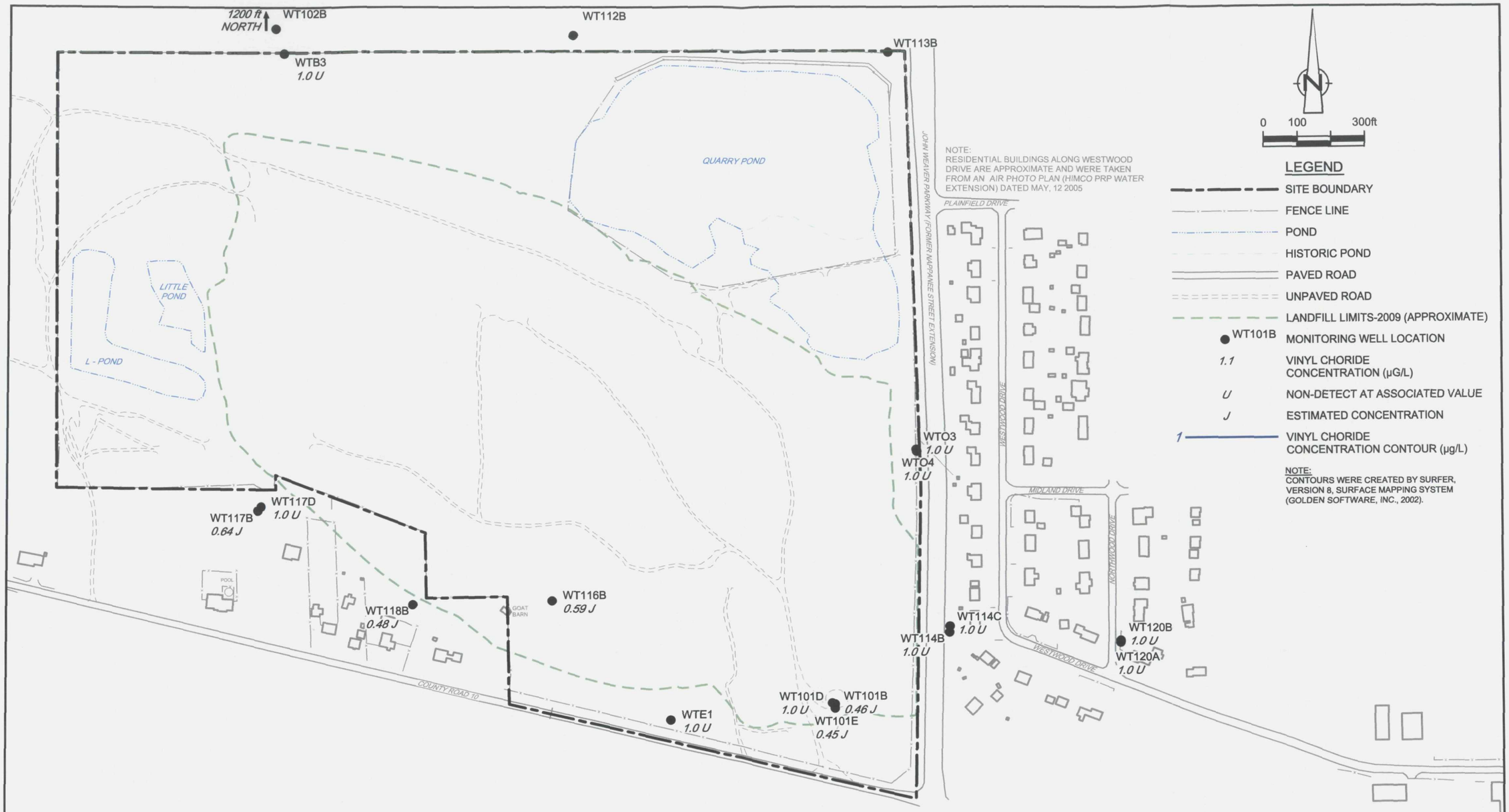


figure 4.5

VINYL CHORIDE CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA032 OCT 27/2010



DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 4.6

VINYL CHORIDE CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA033 OCT 27/2010

figure 4.7

VINYL CHORIDE CONCENTRATIONS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA034 OCT 27/2010

1200 ft NORTH

WT102A

WT112A

WT113A

QUARRY POND

LITTLE POND

L - POND

WT103A
1.0 U

WT117C
0.62 J

WT117A
1.0 U

POOL

GOAT BARN

WT111A
0.65 J

WT116A
4.6

COUNTY ROAD 10

WT119B
1.0 U / 1.0 U

WT115A
0.69 J

WT101A
2.8

WT104A
1.0 U

WT105A
1.0 U

WT106A
1.0 U

WT02
1.0 U

JOHN WEAVER PARKWAY (FORMER NAPPANEE STREET EXTENSION)

PLAINFIELD DRIVE

WESTWOOD DRIVE

MIDLAND DRIVE

NORTHWOOD DRIVE

WT114A
1.0 U

NOTE:
RESIDENTIAL BUILDINGS ALONG WESTWOOD DRIVE ARE APPROXIMATE AND WERE TAKEN FROM AN AIR PHOTO PLAN (HIMCO PRP WATER EXTENSION) DATED MAY, 12 2005

N

0 100 300ft

LEGEND

- SITE BOUNDARY
- FENCE LINE
- POND
- HISTORIC POND
- PAVED ROAD
- UNPAVED ROAD
- LANDFILL LIMITS-2009 (APPROXIMATE)
- WT101A — MONITORING WELL LOCATION
- 4.6 — BENZENE CONCENTRATION (µg/L)
- 1.0 U / 1.0 U — DUPLICATE SAMPLE RESULT (µg/L)
- U — NON-DETECT AT ASSOCIATED VALUE
- J — ESTIMATED CONCENTRATION
- 1 — BENZENE CONCENTRATION CONTOUR (µg/L)

NOTE:
CONTOURS WERE CREATED BY SURFER, VERSION 8, SURFACE MAPPING SYSTEM (GOLDEN SOFTWARE, INC., 2002).

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

CRA

39611-00(029)GN-WA024 OCT 27/2010

figure 4.8

BENZENE CONCENTRATION CONTOURS UPPER AQUIFER - JUNE 2010 HIMCO SITE

Elkhart, Indiana

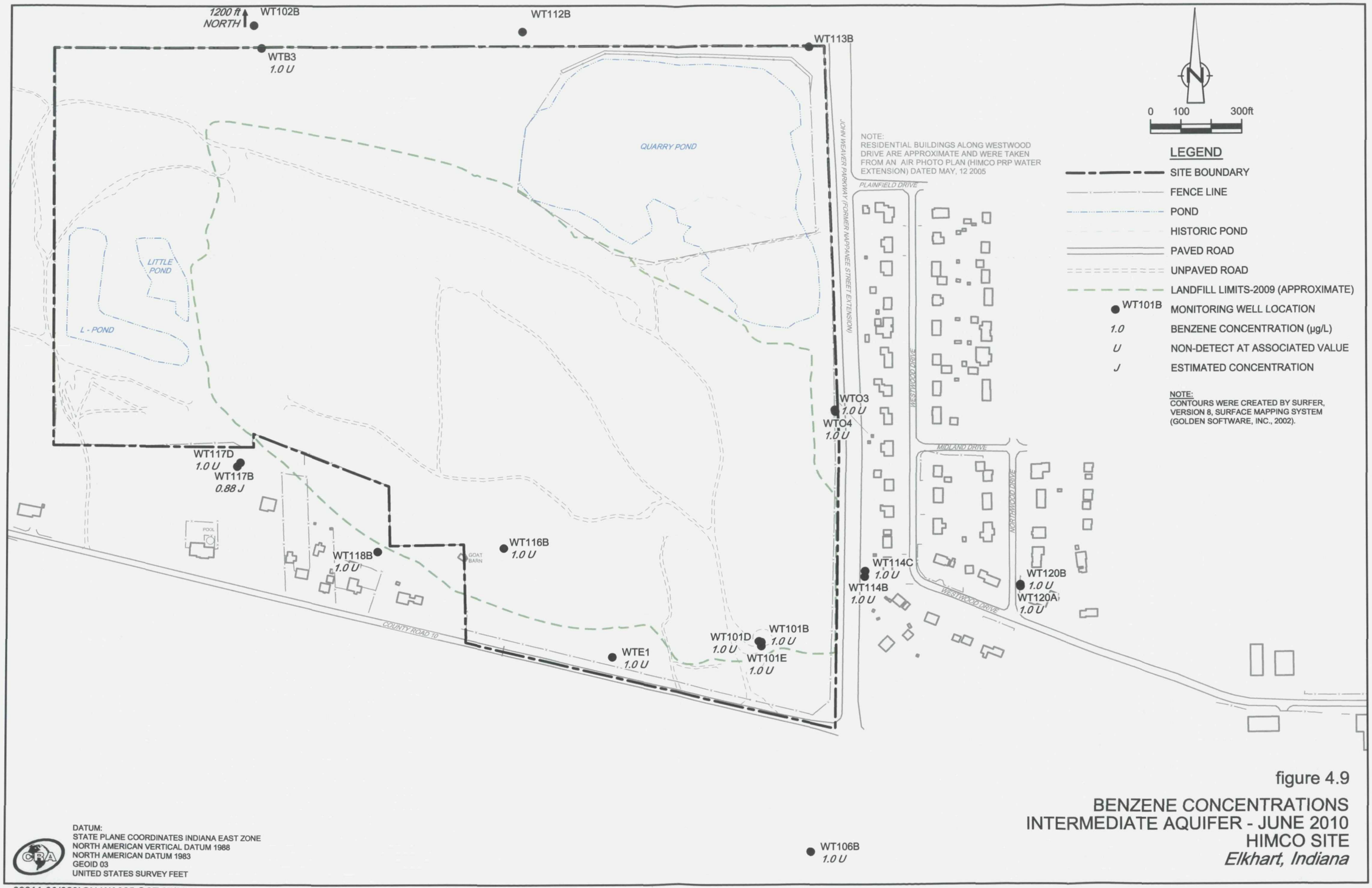


figure 4.9

BENZENE CONCENTRATIONS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA025 OCT 27/2010

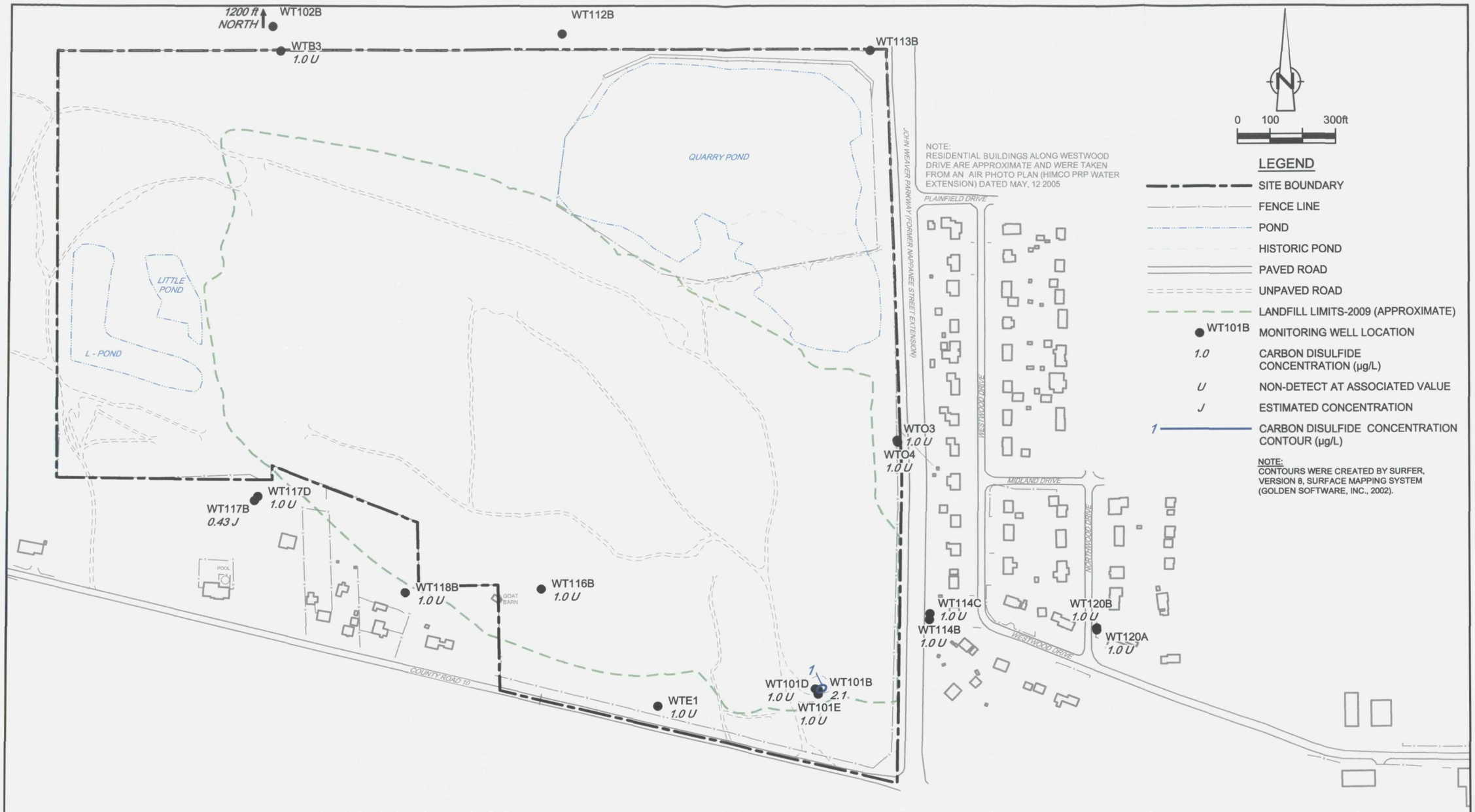


figure 4.10

CARBON DISULFIDE CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA027 OCT 27/2010

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA028 OCT 27/2010

figure 4.11

CARBON DISULFIDE CONCENTRATIONS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

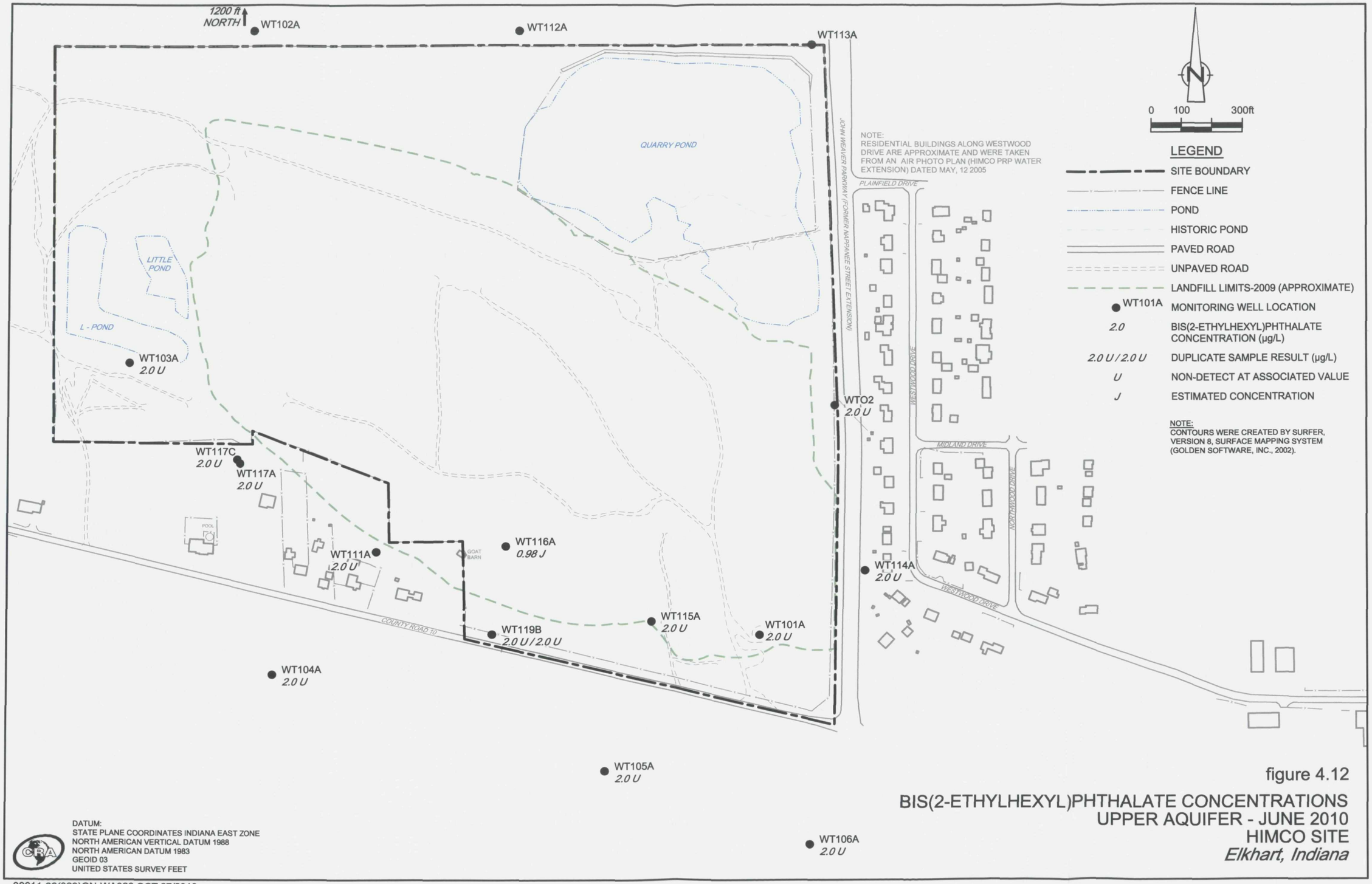


figure 4.12

BIS(2-ETHYLHEXYL)PHTHALATE CONCENTRATIONS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA026 OCT 27/2010

1200 ft NORTH

WT102A

WT112A

WT113A

QUARRY POND

LITTLE POND

L - POND

WT103A
3.0 U

WT117C
3.0 U

WT117A
3.0 U

POOL

GOAT BARN

WT111A
3.0 U

WT116A
3.0 U

3

5

15

WT115A
15.8

WT119B
3.0 U

COUNTY ROAD 10

WT104A
3.0 U

WT105A
3.0 U

WT106A
3.0 U

JOHN WEAVER PARKWAY (FORMER NAPPANEE STREET EXTENSION)

PLAINFIELD DRIVE

JUDD DOMINICK DRIVE

MIDLAND DRIVE

NORTHWOOD DRIVE

WESTWOOD DRIVE

WT102
3.0 U

WT114A
3.0 U

WT101A
3.0 U

NOTE:
RESIDENTIAL BUILDINGS ALONG WESTWOOD DRIVE ARE APPROXIMATE AND WERE TAKEN FROM AN AIR PHOTO PLAN (HIMCO PRP WATER EXTENSION) DATED MAY, 12 2005

N

0 100 300ft

LEGEND

- SITE BOUNDARY
- FENCE LINE
- POND
- HISTORIC POND
- PAVED ROAD
- UNPAVED ROAD
- LANDFILL LIMITS-2009 (APPROXIMATE)
- WT101A — MONITORING WELL LOCATION
- 15.8 — LEAD CONCENTRATION (µg/L)
- 3.0 U / 3.0 U — DUPLICATE SAMPLE RESULT (µg/L)
- U — NON-DETECT AT ASSOCIATED VALUE
- 5 — LEAD CONCENTRATION CONTOUR (µg/L)
- 15 — PRIMARY MCL (µg/L)
- 3 — BACKGROUND VALUE (µg/L)

NOTE:
CONTOURS WERE CREATED BY SURFER, VERSION 8, SURFACE MAPPING SYSTEM (GOLDEN SOFTWARE, INC., 2002).

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

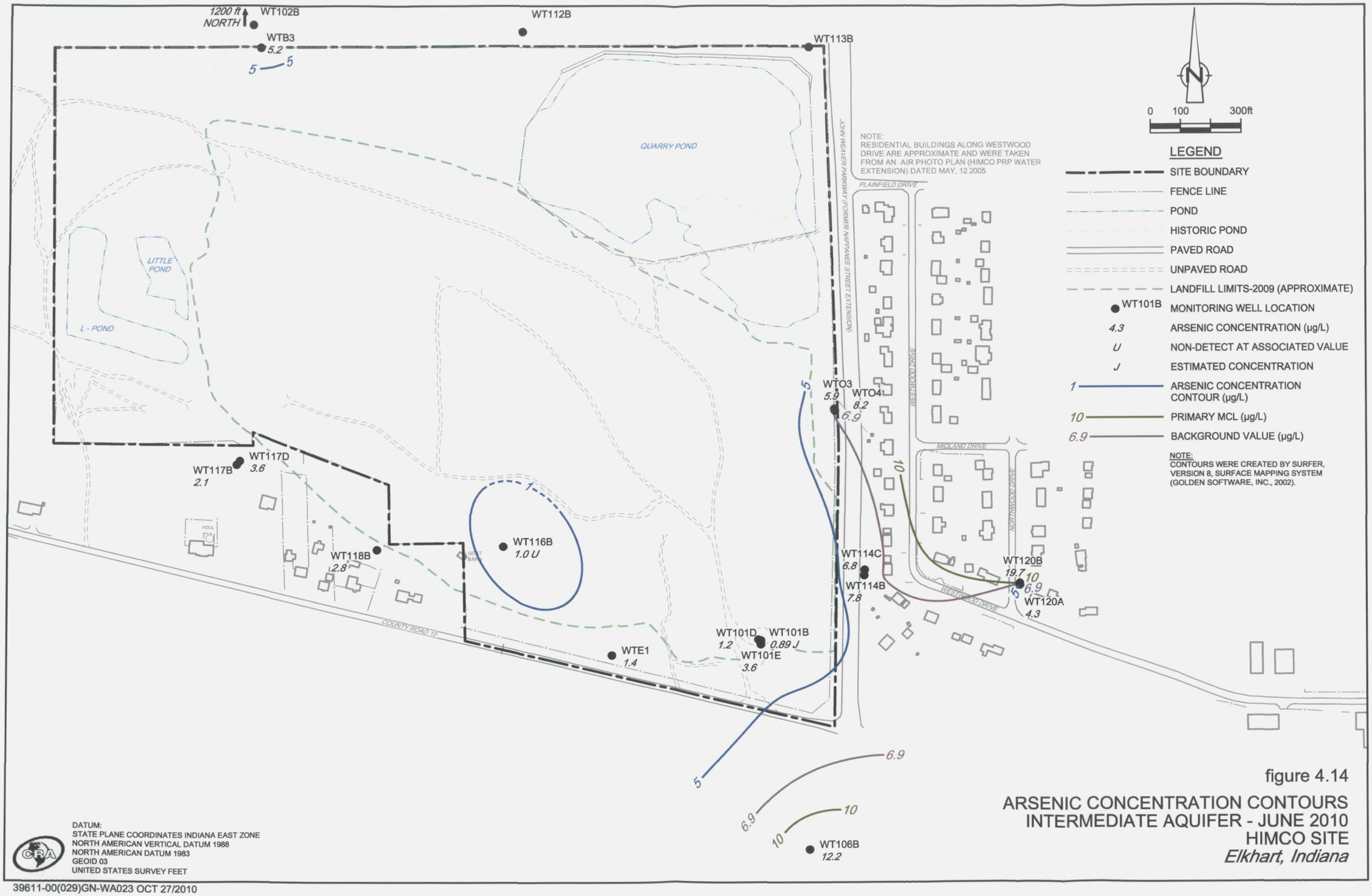
CRA

39611-00(029)GN-WA031 OCT 27/2010

figure 4.13

LEAD CONCENTRATION CONTOURS UPPER AQUIFER - JUNE 2010 HIMCO SITE

Elkhart, Indiana



DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 4.14

ARSENIC CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA023 OCT 27/2010

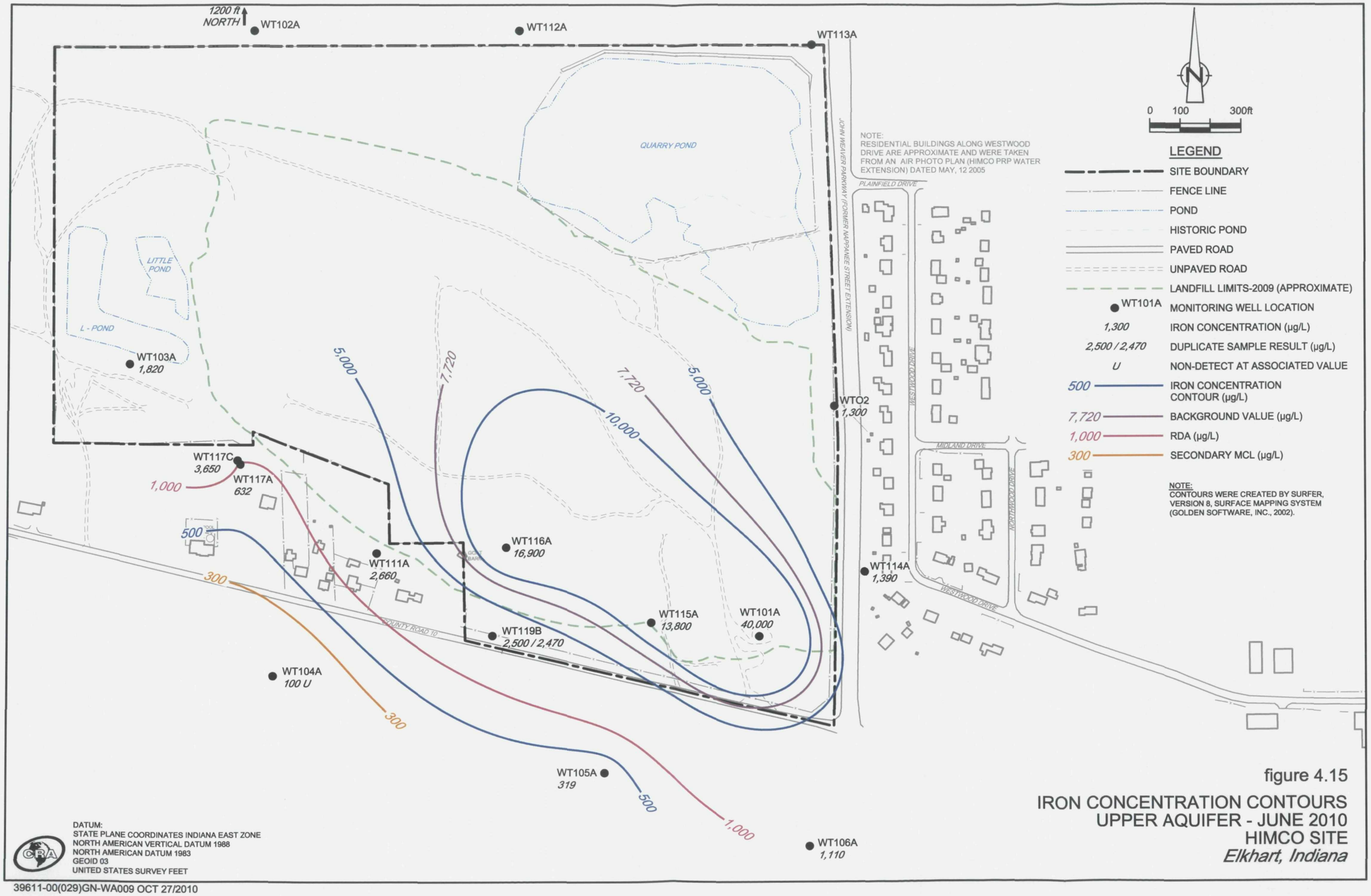


figure 4.15

IRON CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA009 OCT 27/2010

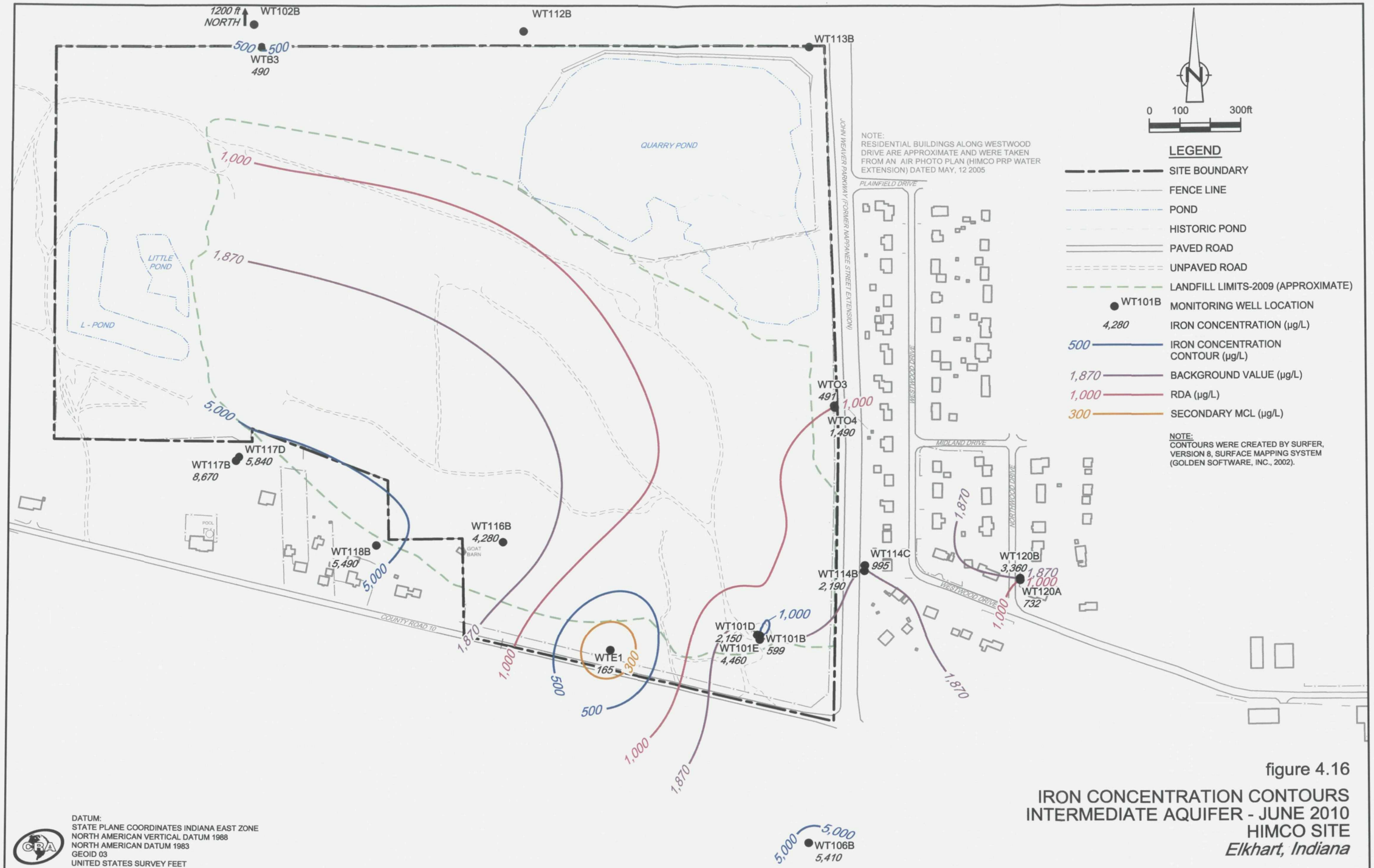


figure 4.16

IRON CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA010 OCT 27/2010

figure 4.17

IRON CONCENTRATION CONTOURS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA011 OCT 27/2010

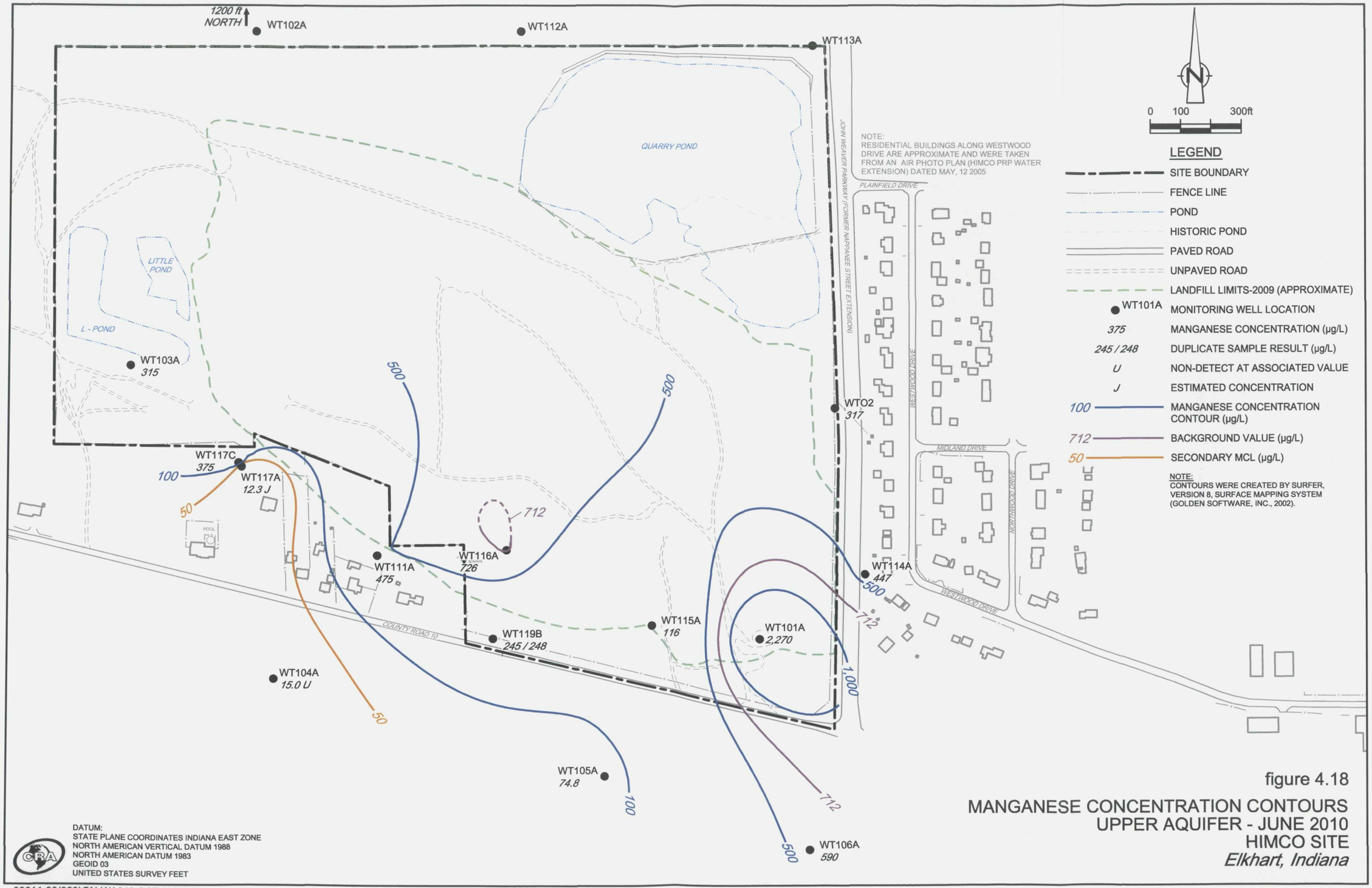
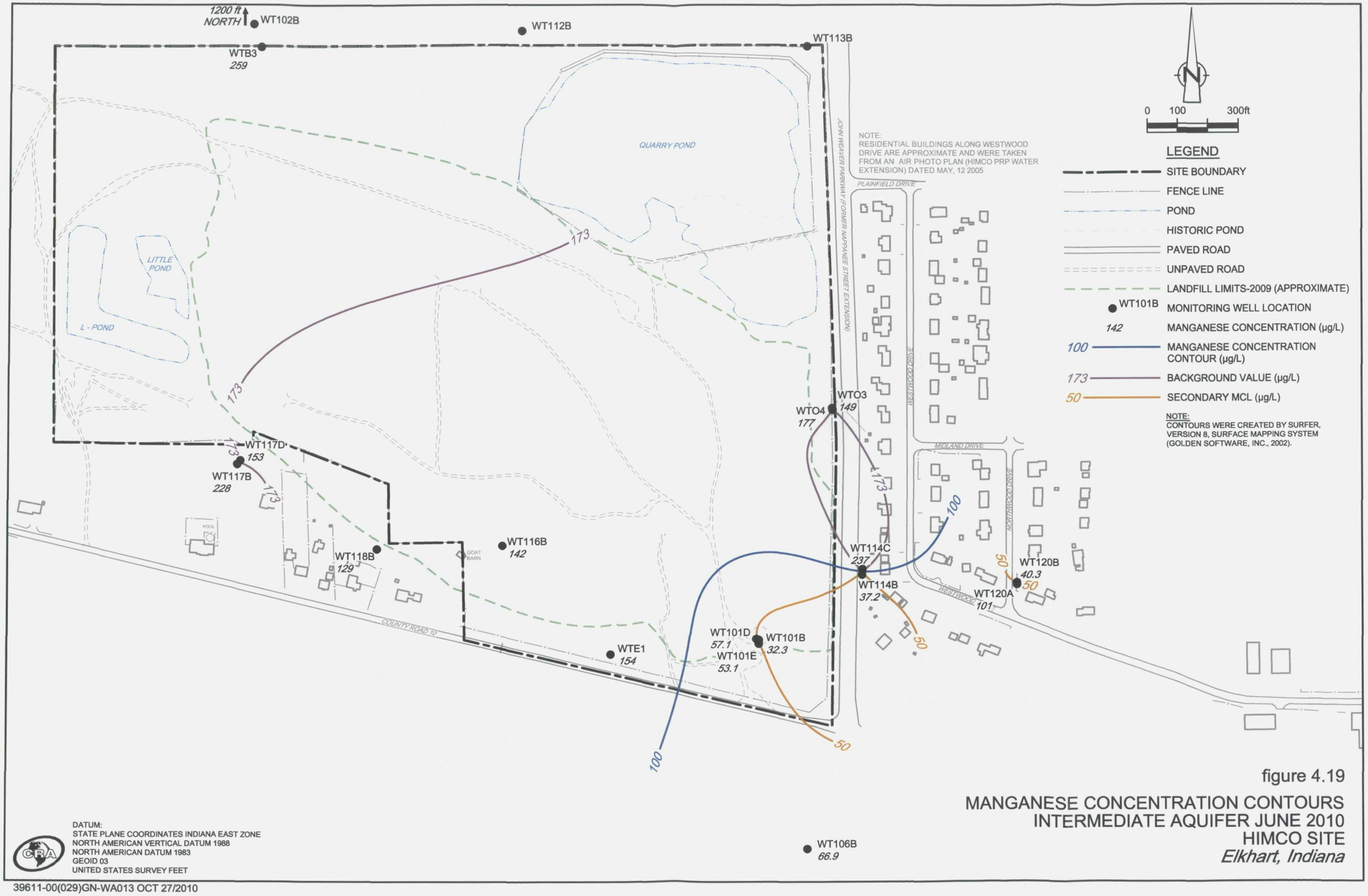


figure 4.18

MANGANESE CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA012 OCT 27/2010



DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 4.19

MANGANESE CONCENTRATION CONTOURS
INTERMEDIATE AQUIFER JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA013 OCT 27/2010

figure 4.20

MANGANESE CONCENTRATION CONTOURS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA014 OCT 27/2010

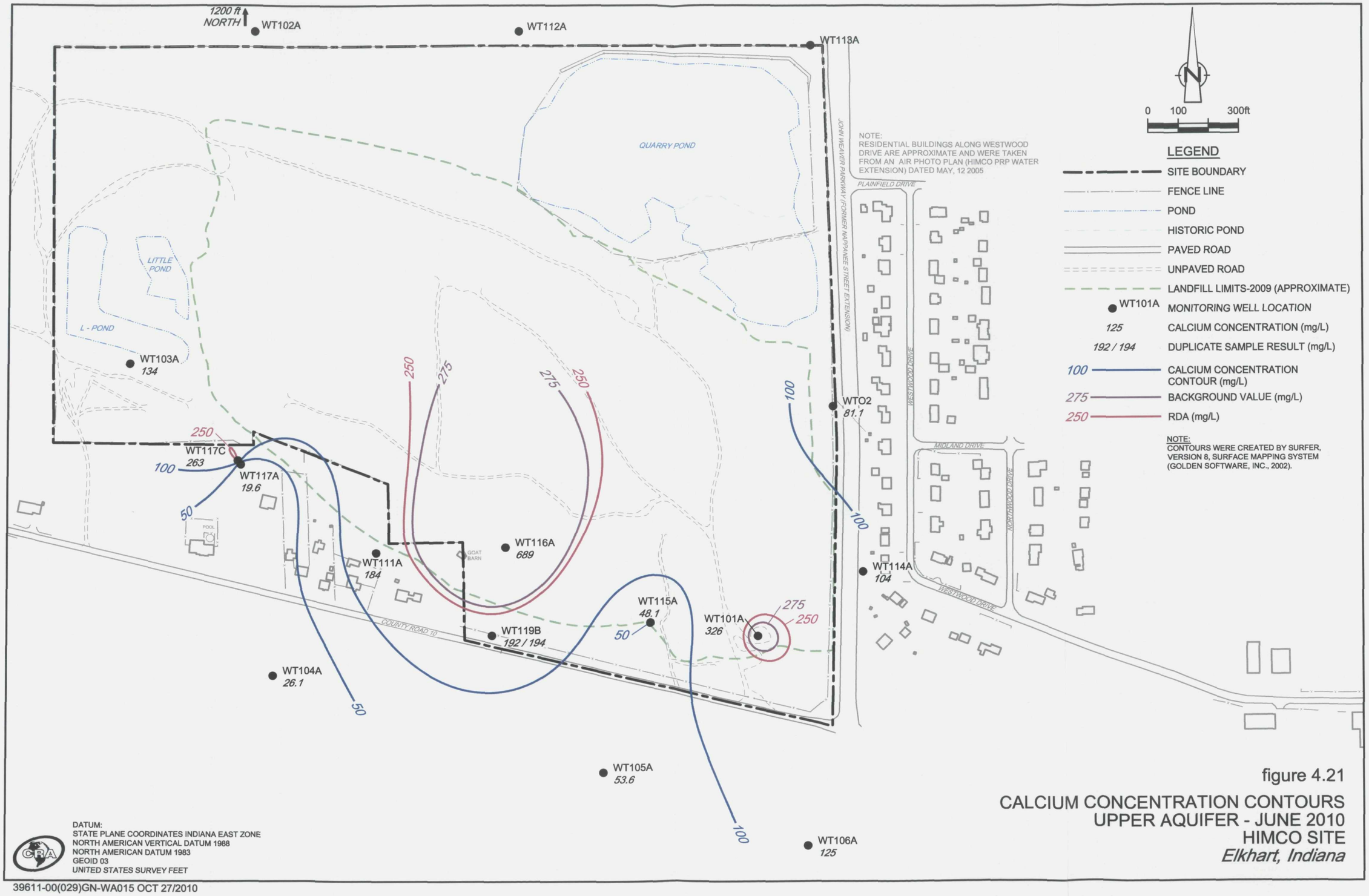


figure 4.21

CALCIUM CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA015 OCT 27/2010

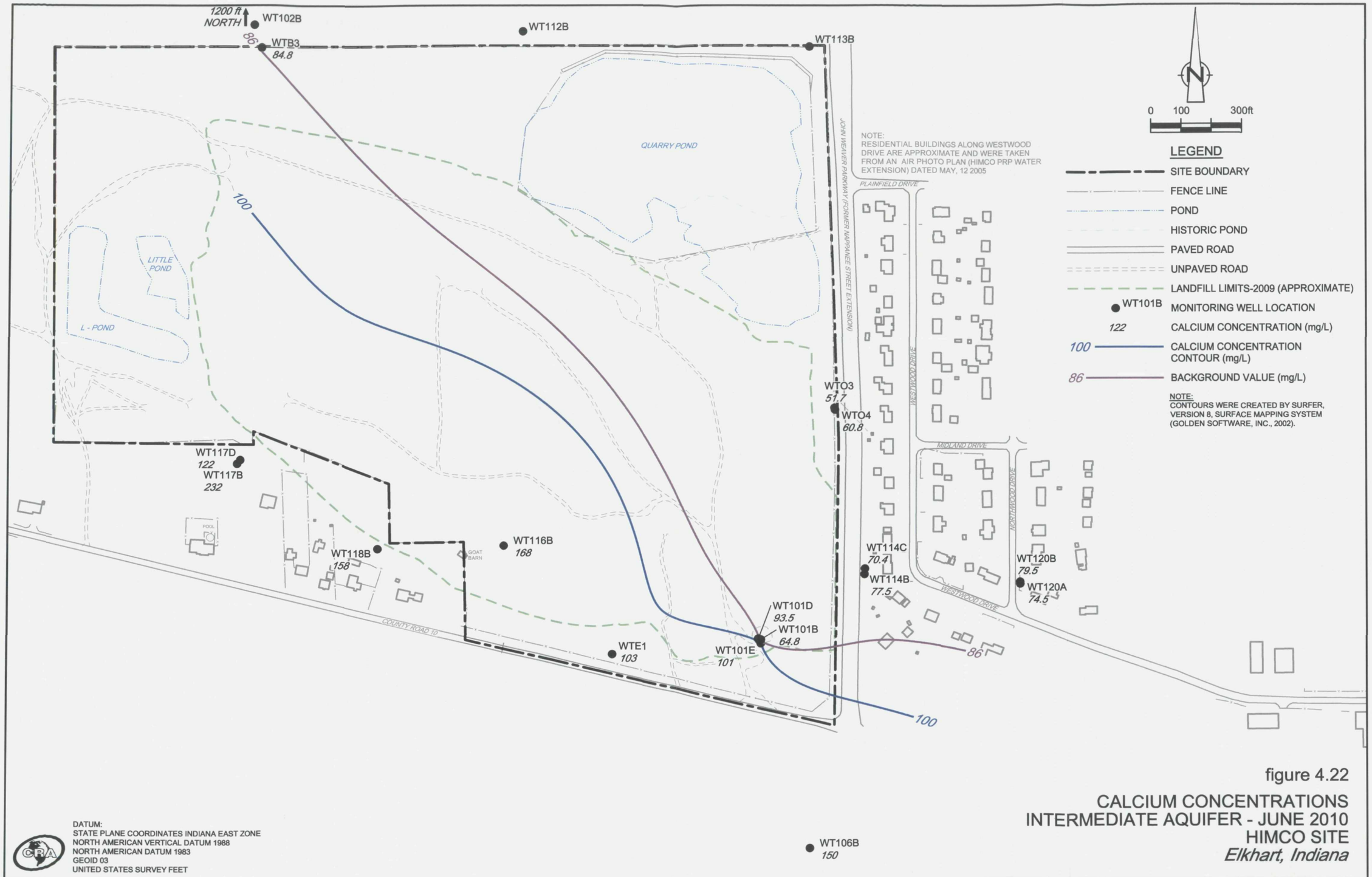


figure 4.22

CALCIUM CONCENTRATIONS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA016 OCT 27/2010

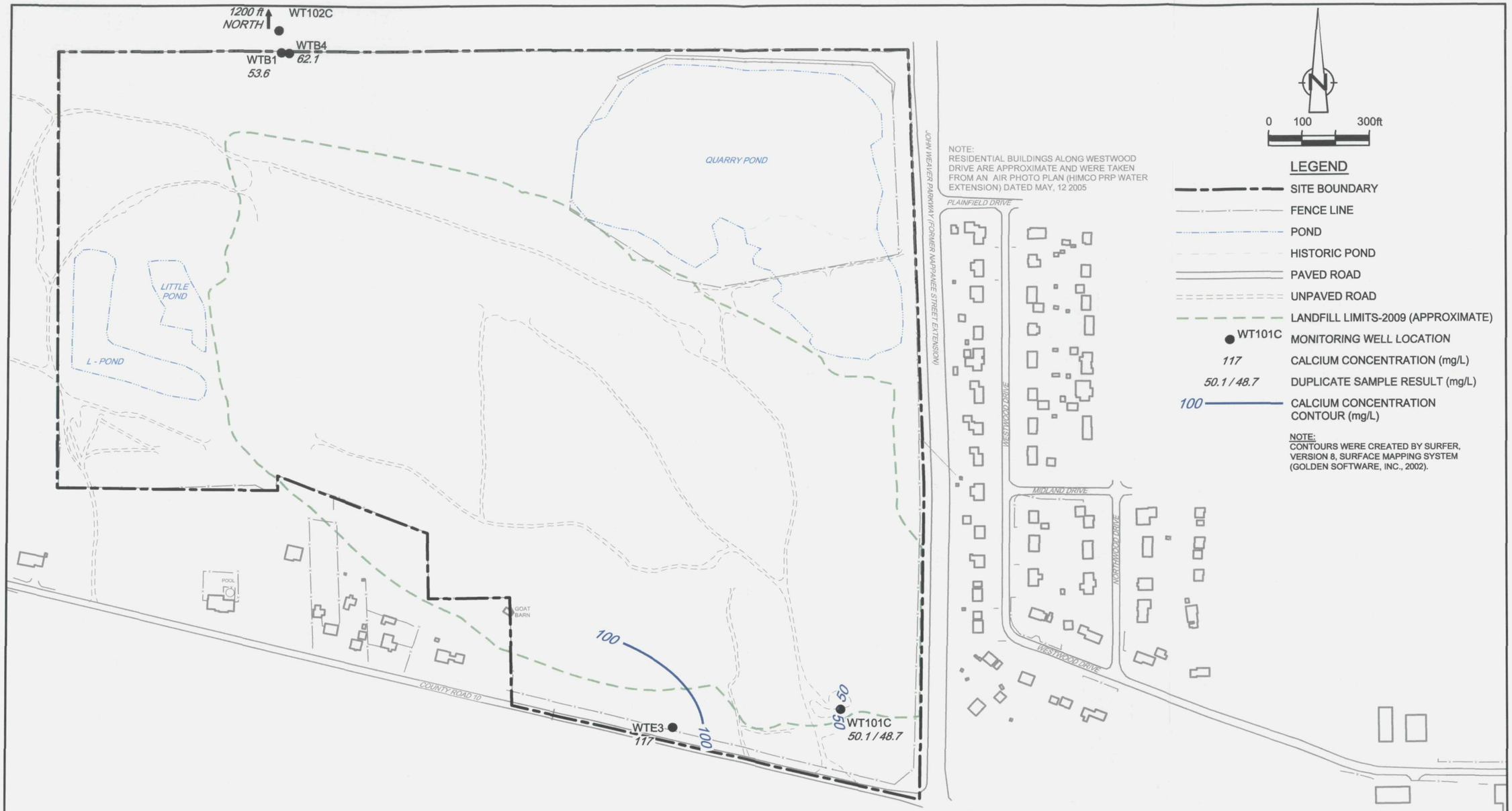


figure 4.23

CALCIUM CONCENTRATIONS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA017 OCT 27/2010

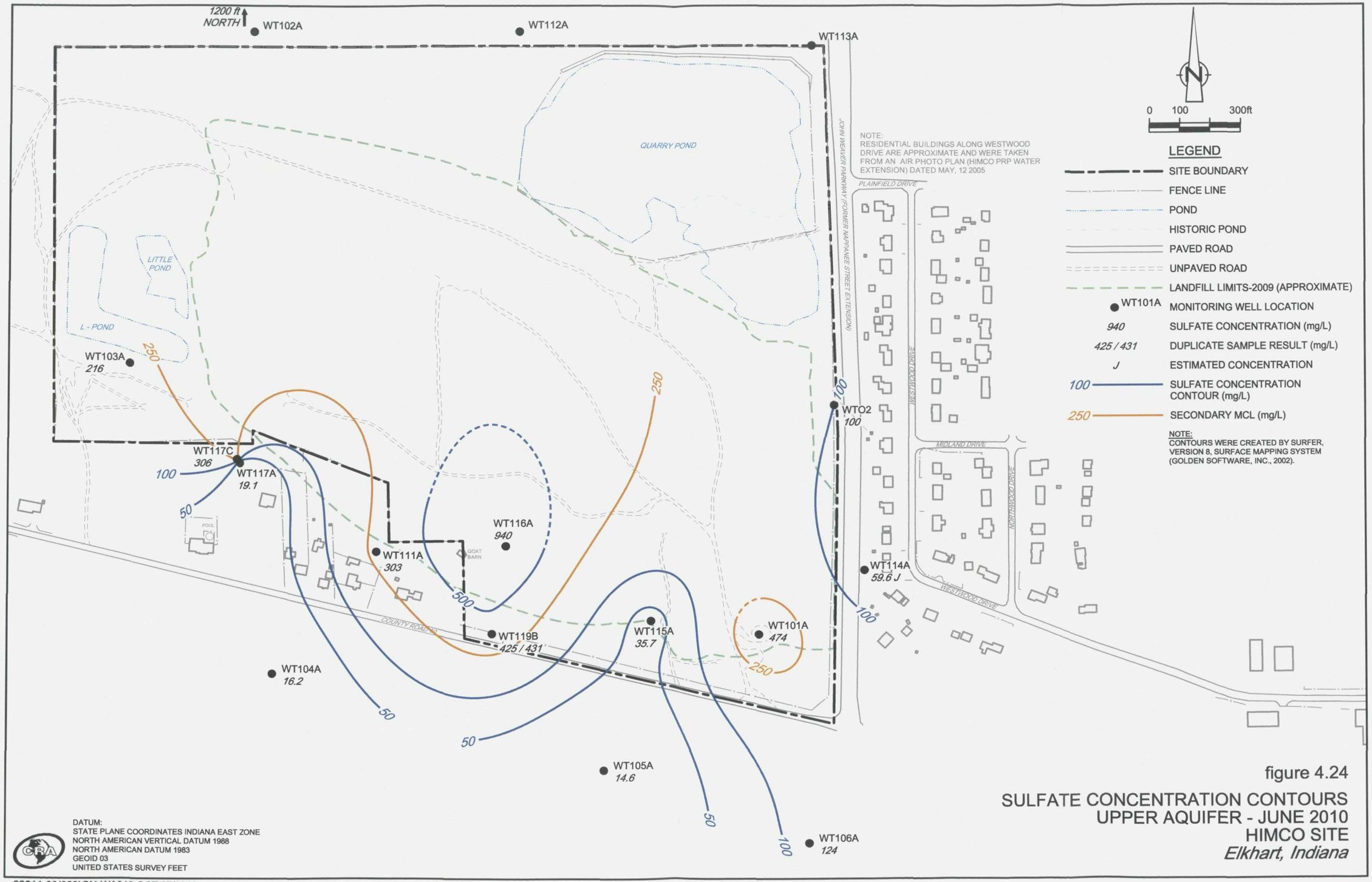


figure 4.24

SULFATE CONCENTRATION CONTOURS
UPPER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA018 OCT 27/2010

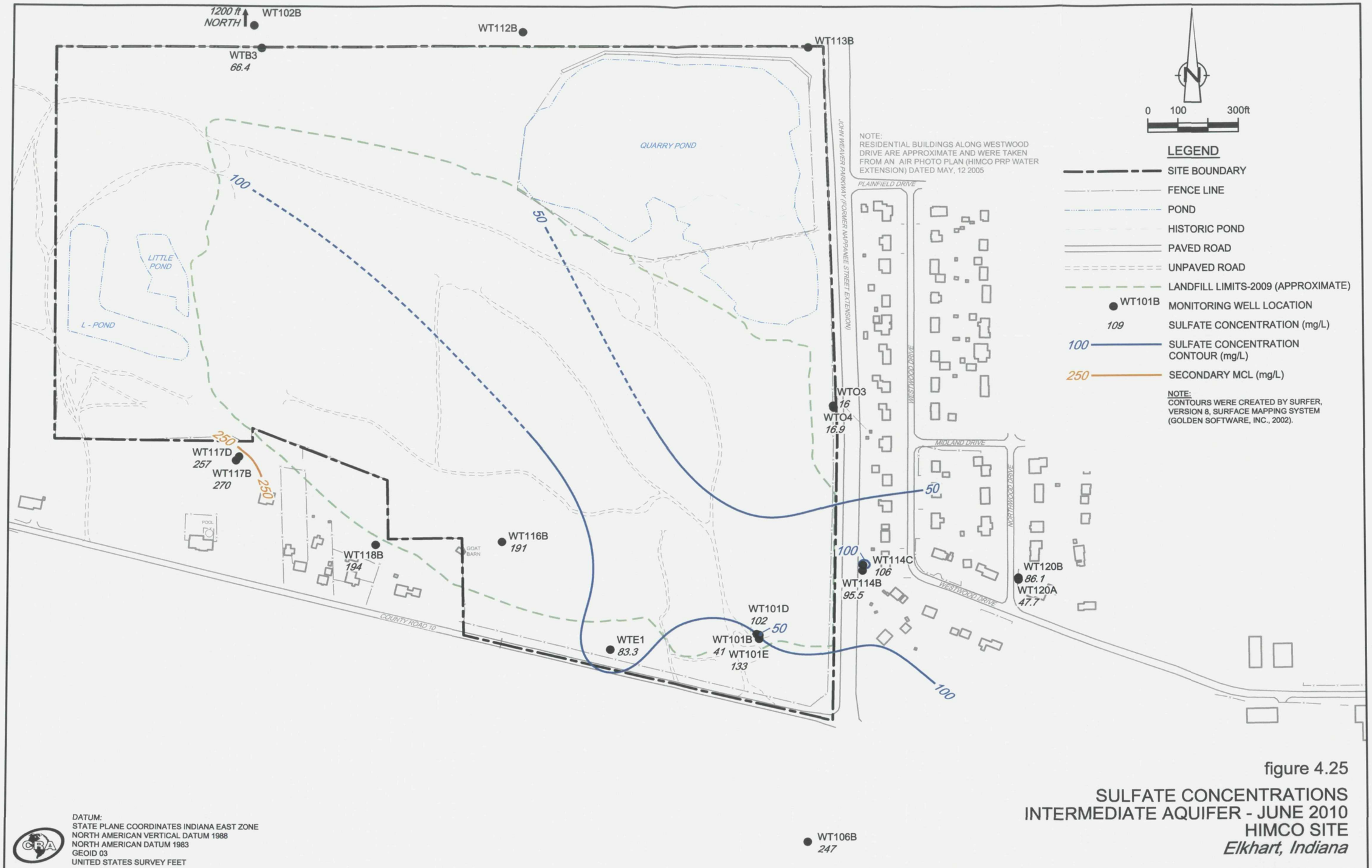


figure 4.25

SULFATE CONCENTRATIONS
INTERMEDIATE AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

39611-00(029)GN-WA019 OCT 27/2010

DATUM:
STATE PLANE COORDINATES INDIANA EAST ZONE
NORTH AMERICAN VERTICAL DATUM 1988
NORTH AMERICAN DATUM 1983
GEOID 03
UNITED STATES SURVEY FEET

figure 4.26

SULFATE CONCENTRATIONS
LOWER AQUIFER - JUNE 2010
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA020 OCT 27/2010

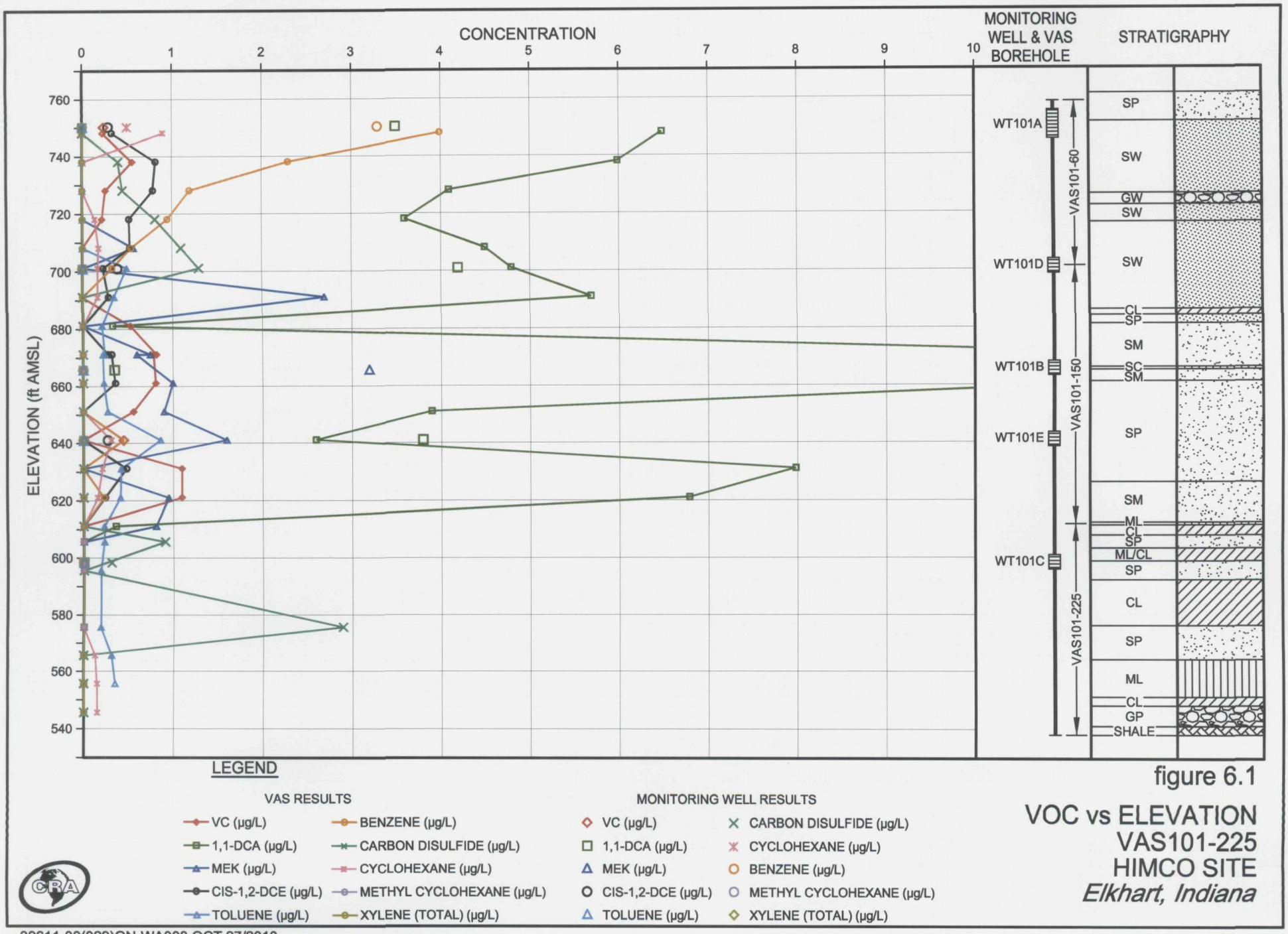


figure 6.1

VOC vs ELEVATION
VAS101-225
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

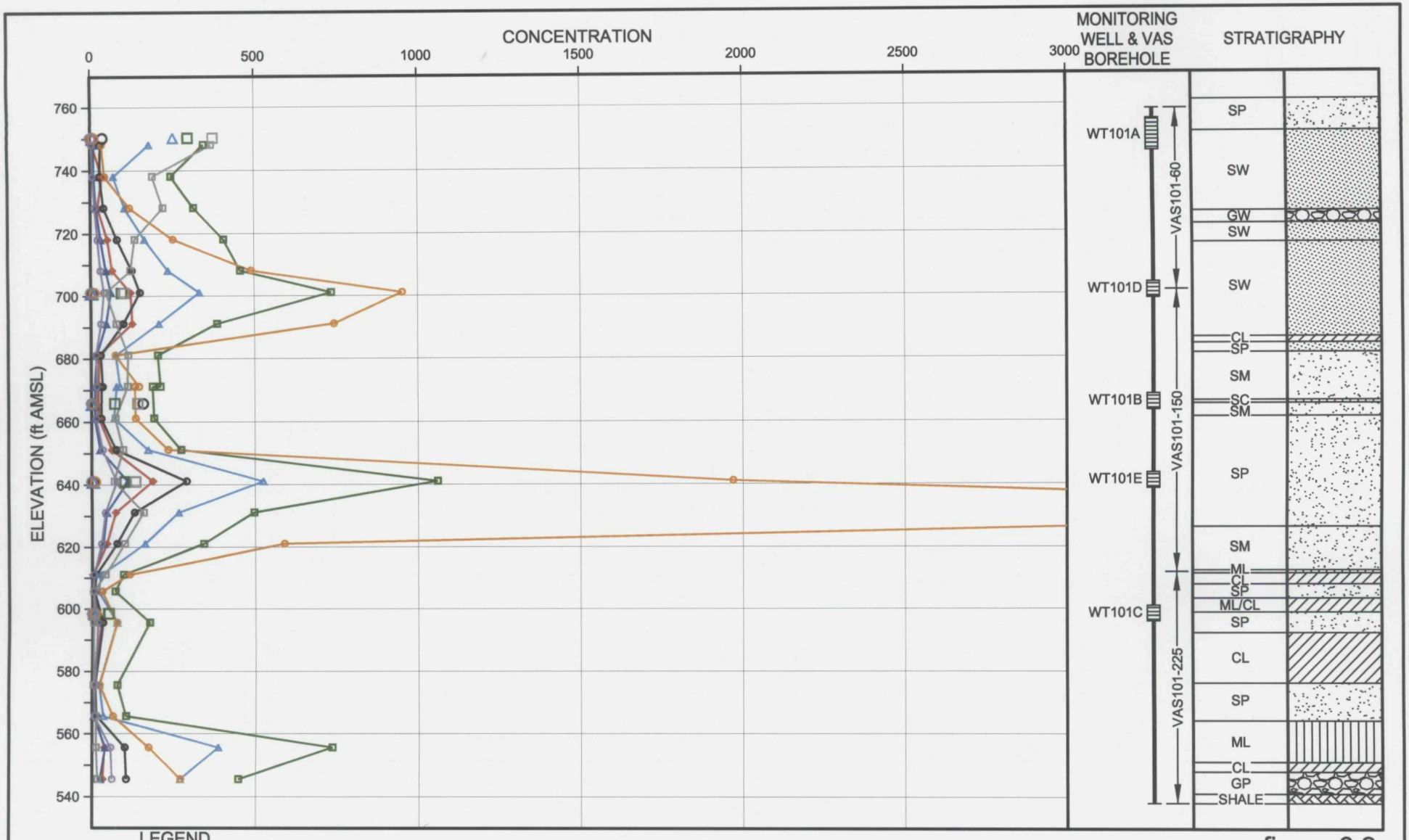


figure 6.2

METALS AND GENERAL CHEMISTRY PARAMETERS vs ELEVATION - VAS101-225

HIMCO SITE

Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

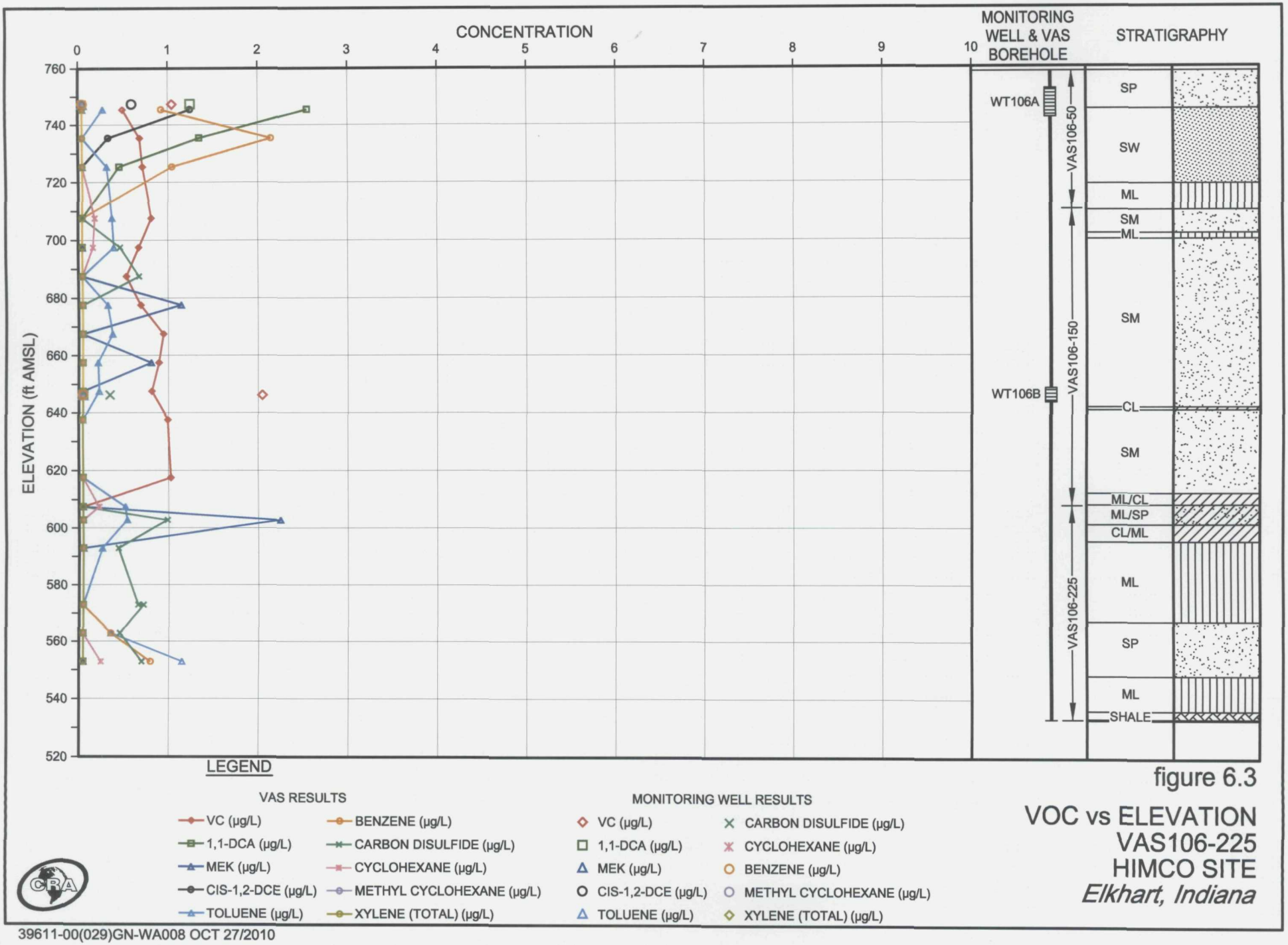


figure 6.3

VOC vs ELEVATION
VAS106-225
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

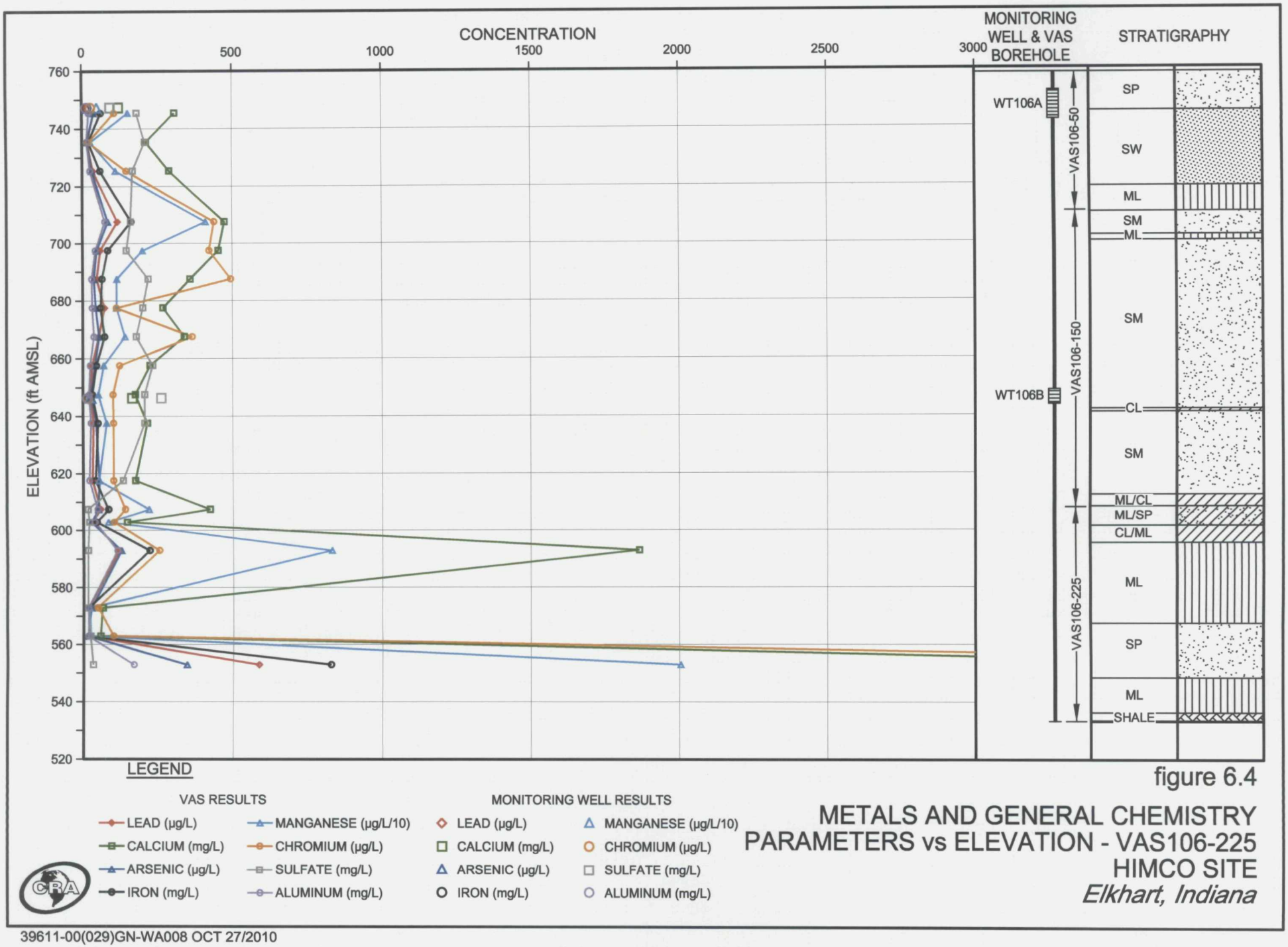


figure 6.4

METALS AND GENERAL CHEMISTRY PARAMETERS vs ELEVATION - VAS106-225

HIMCO SITE

Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

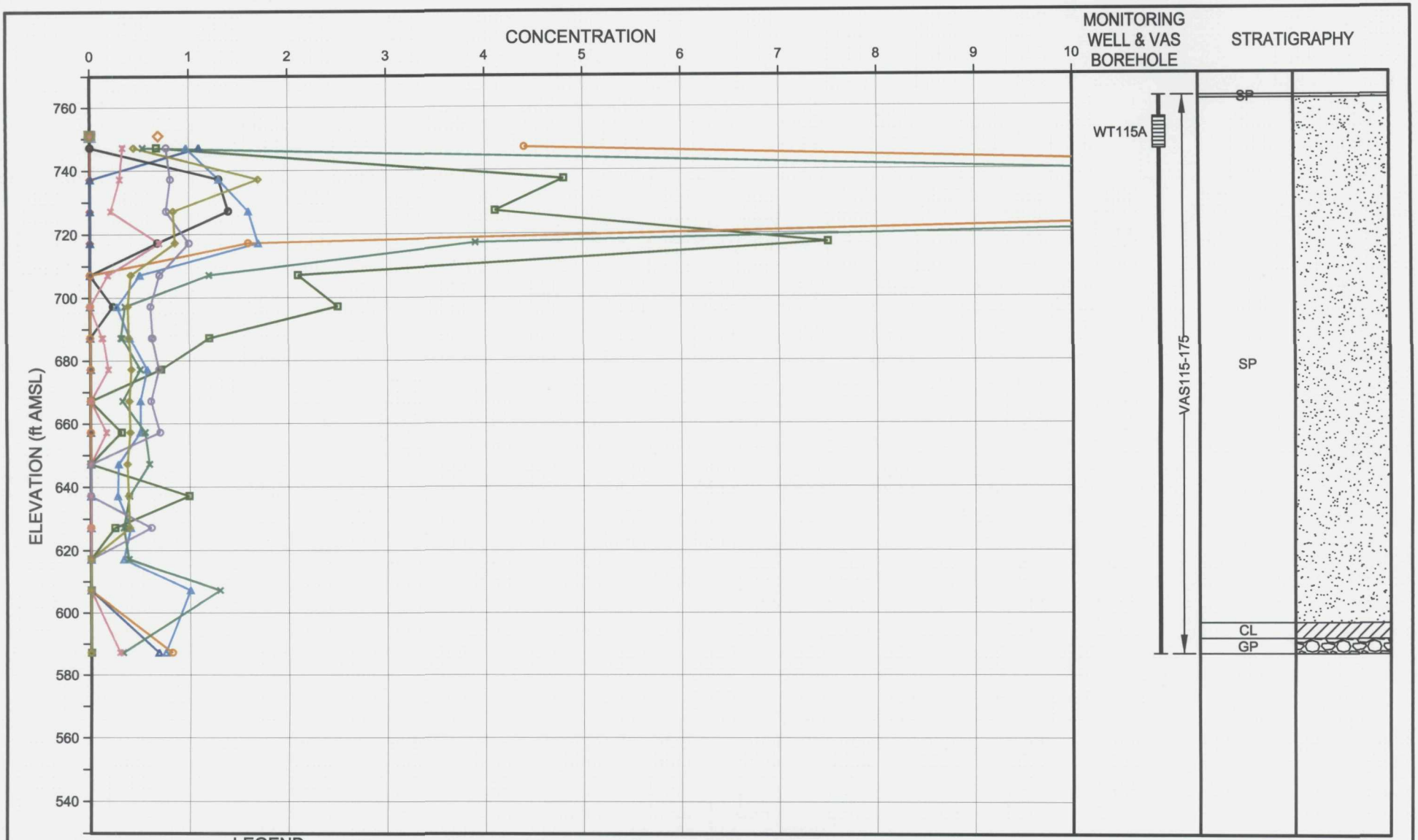


figure 6.5

VOC vs ELEVATION
VAS115-175
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

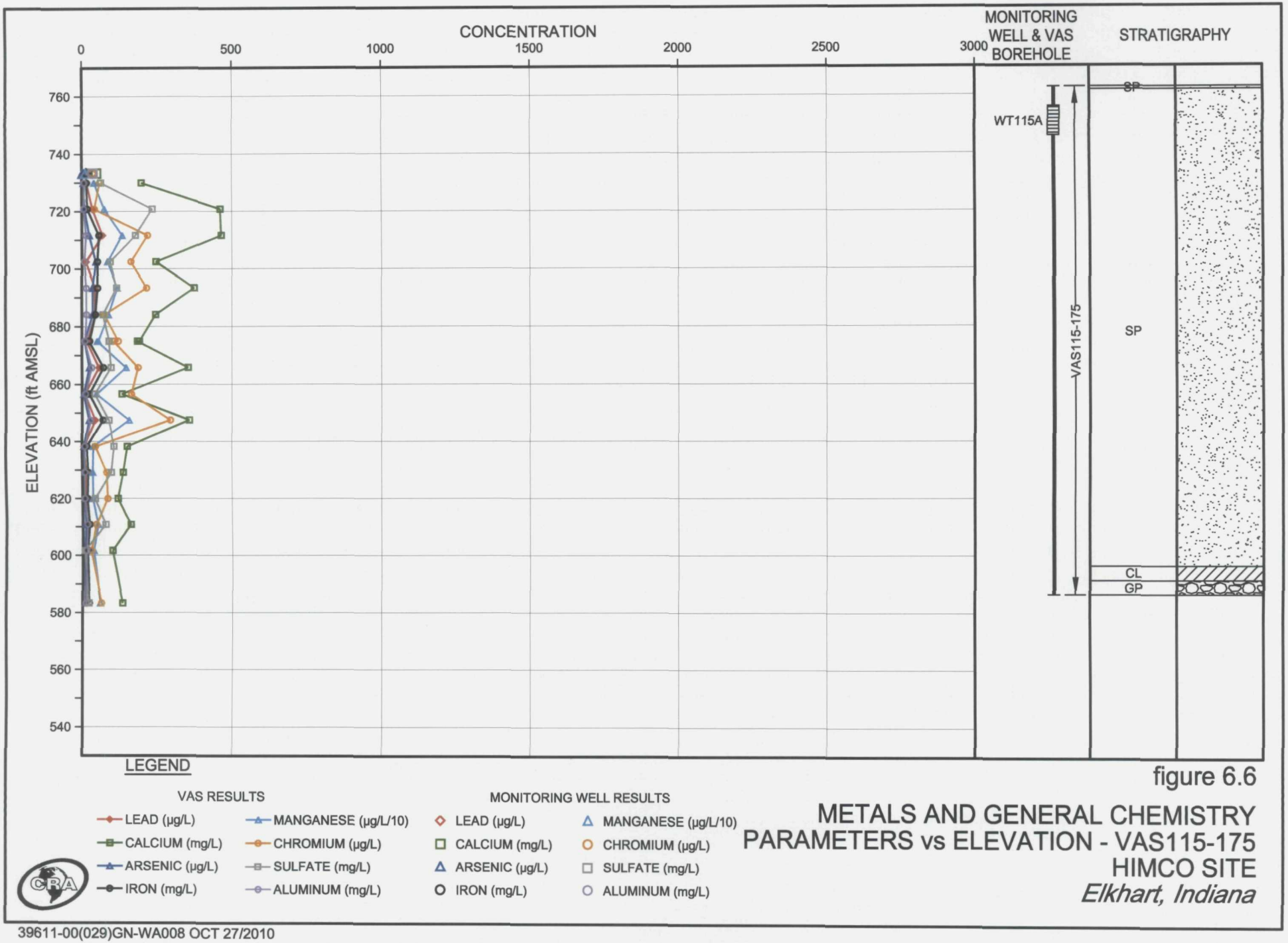


figure 6.6

METALS AND GENERAL CHEMISTRY PARAMETERS vs ELEVATION - VAS115-175

HIMCO SITE

Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

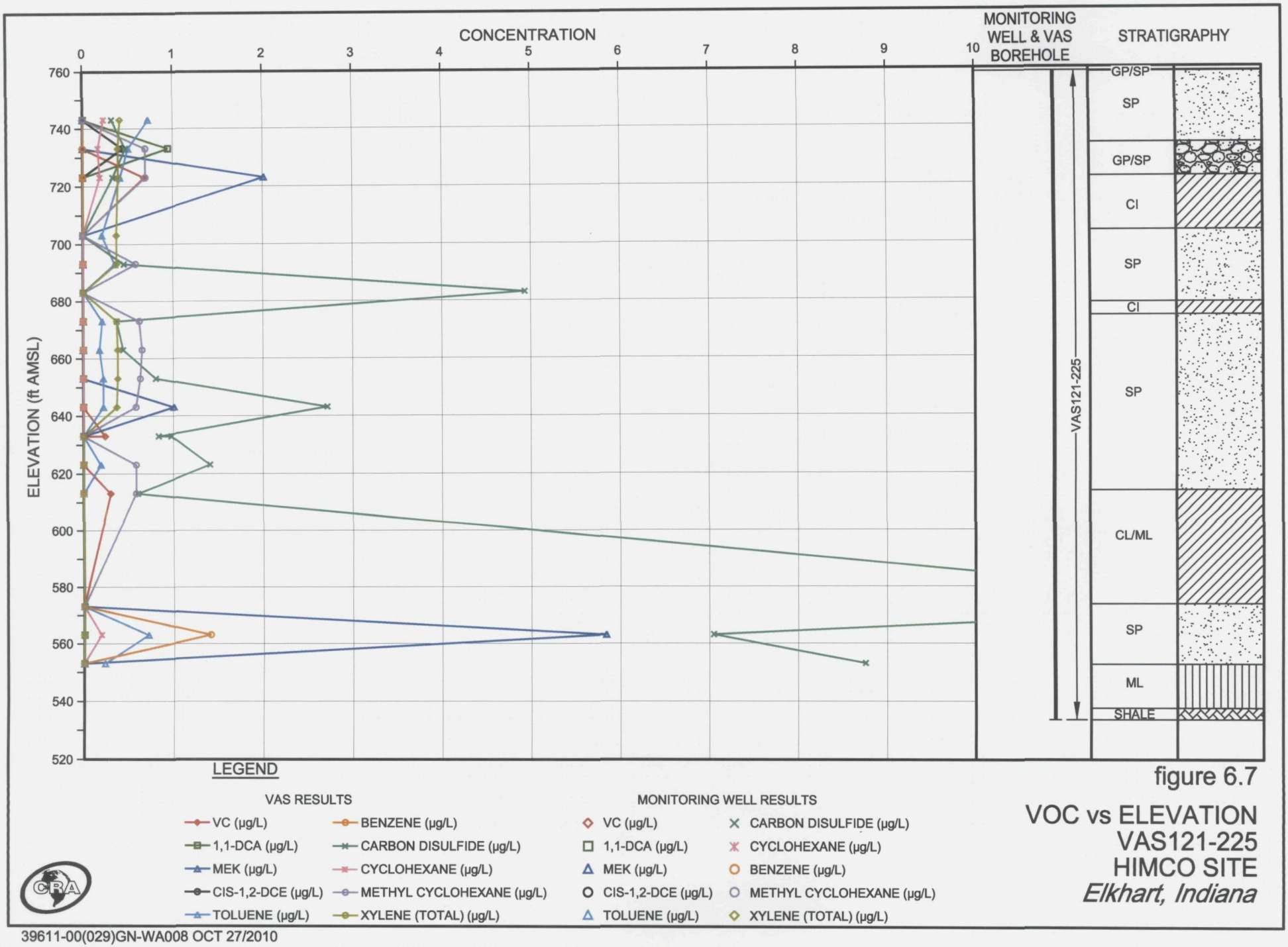


figure 6.7

VOC vs ELEVATION
VAS121-225
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA008 OCT 27/2010

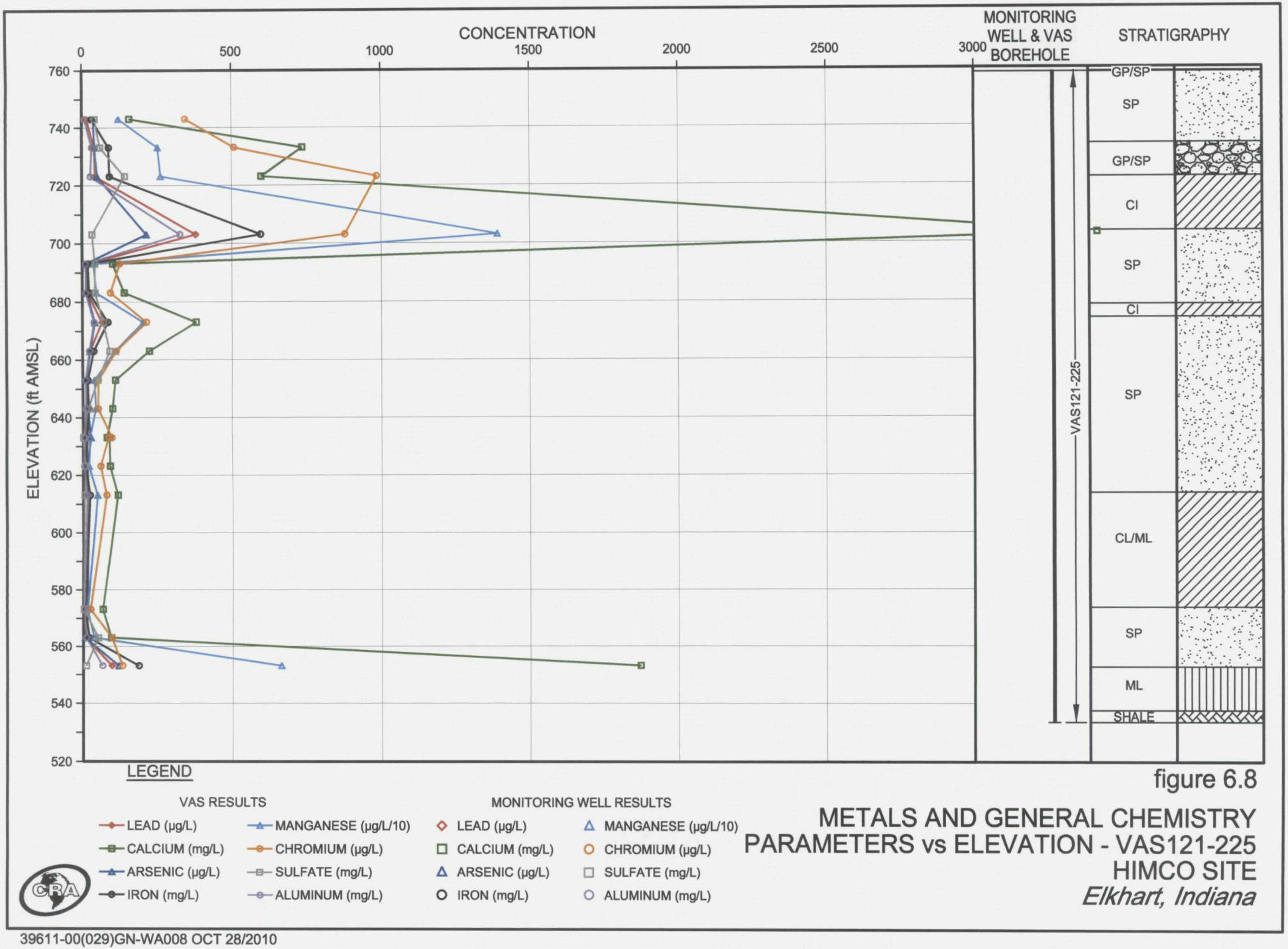


figure 6.8

METALS AND GENERAL CHEMISTRY PARAMETERS vs ELEVATION - VAS121-225 HIMCO SITE

Elkhart, Indiana

39611-00(029)GN-WA008 OCT 28/2010

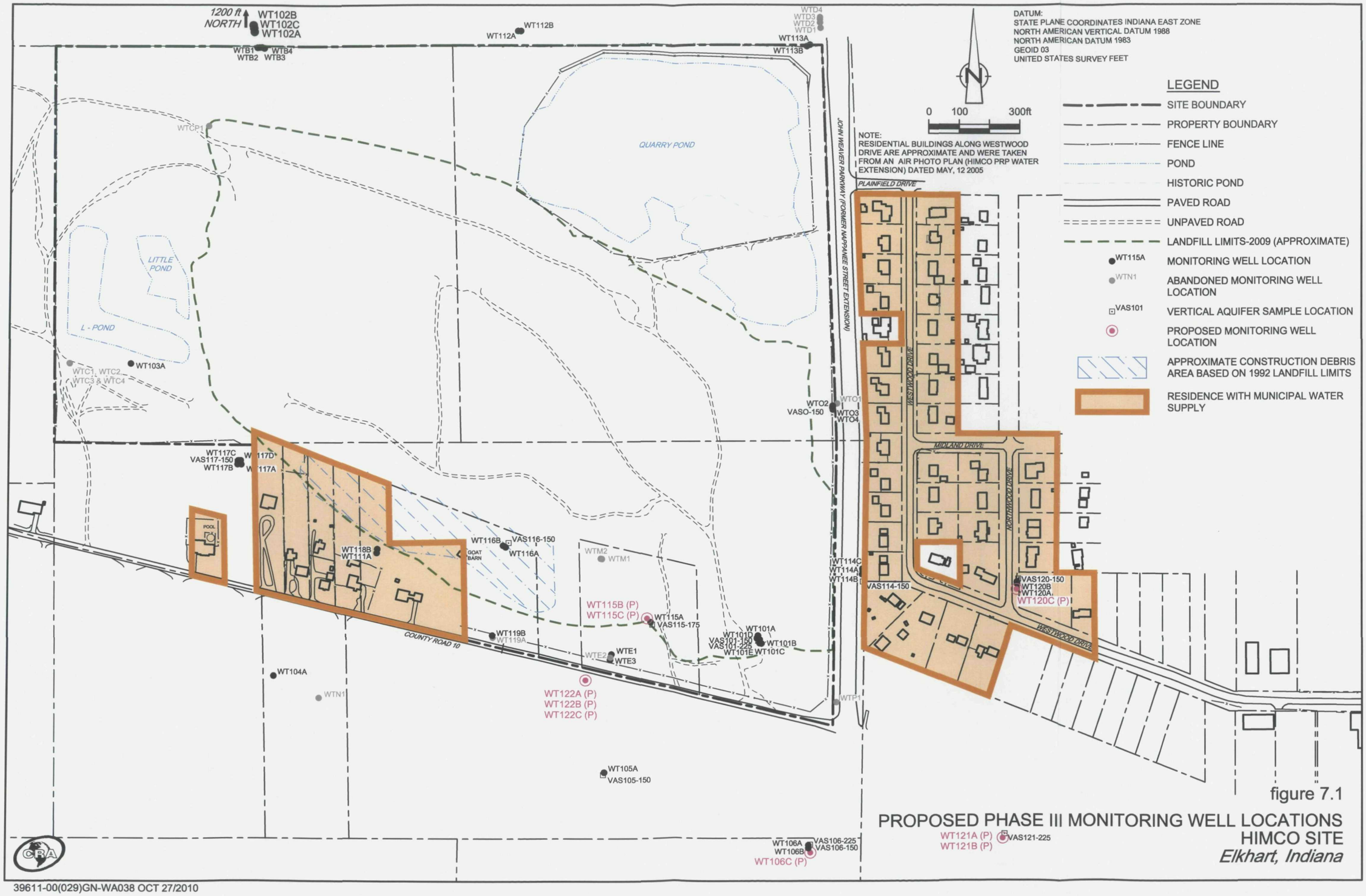
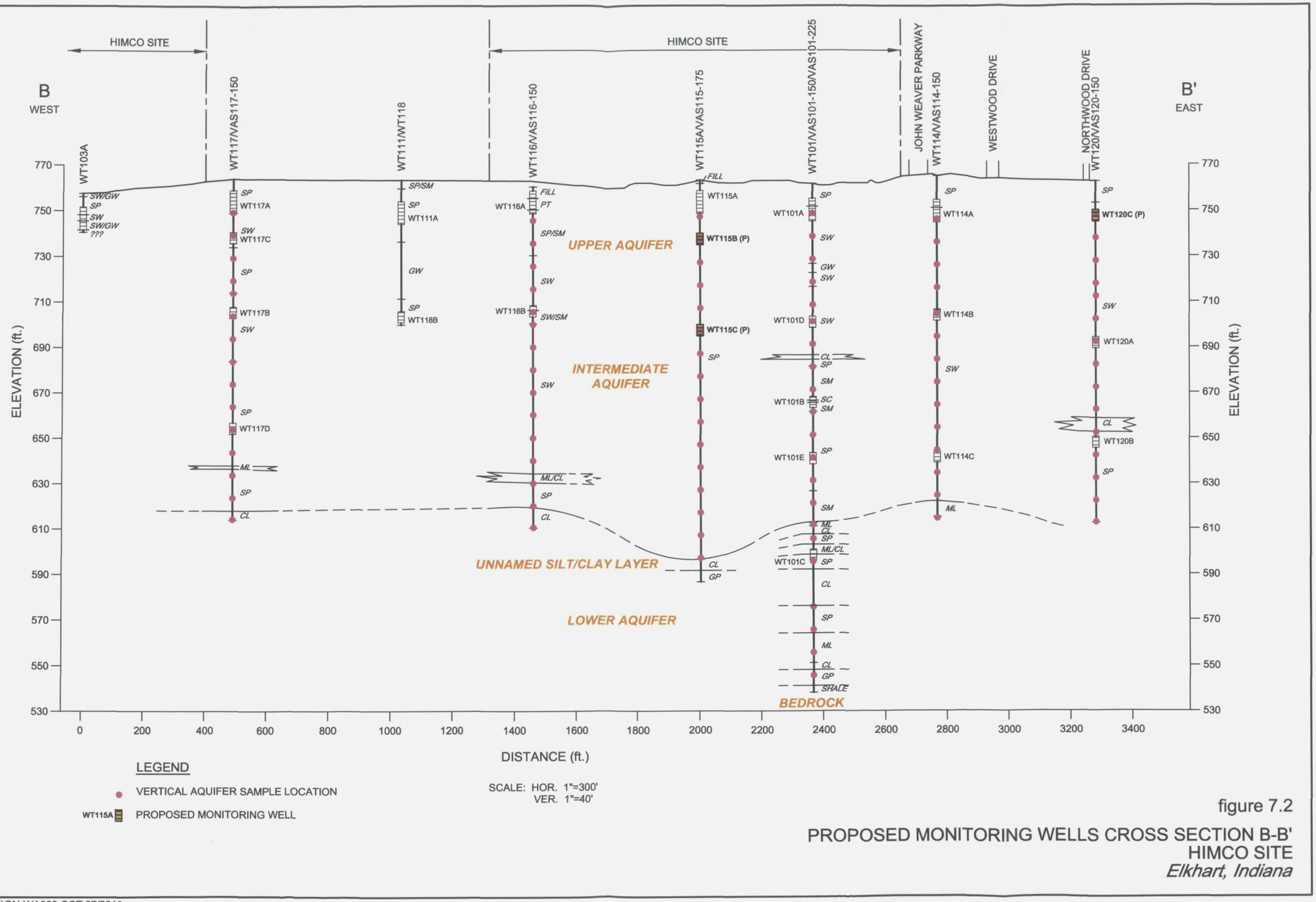


figure 7.1

PROPOSED PHASE III MONITORING WELL LOCATIONS
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA038 OCT 27/2010



LEGEND

- VERTICAL AQUIFER SAMPLE LOCATION
- WT115A PROPOSED MONITORING WELL

SCALE: HOR. 1"=300'
VER. 1"=40'

figure 7.2

PROPOSED MONITORING WELLS CROSS SECTION B-B'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA039 OCT 27/2010

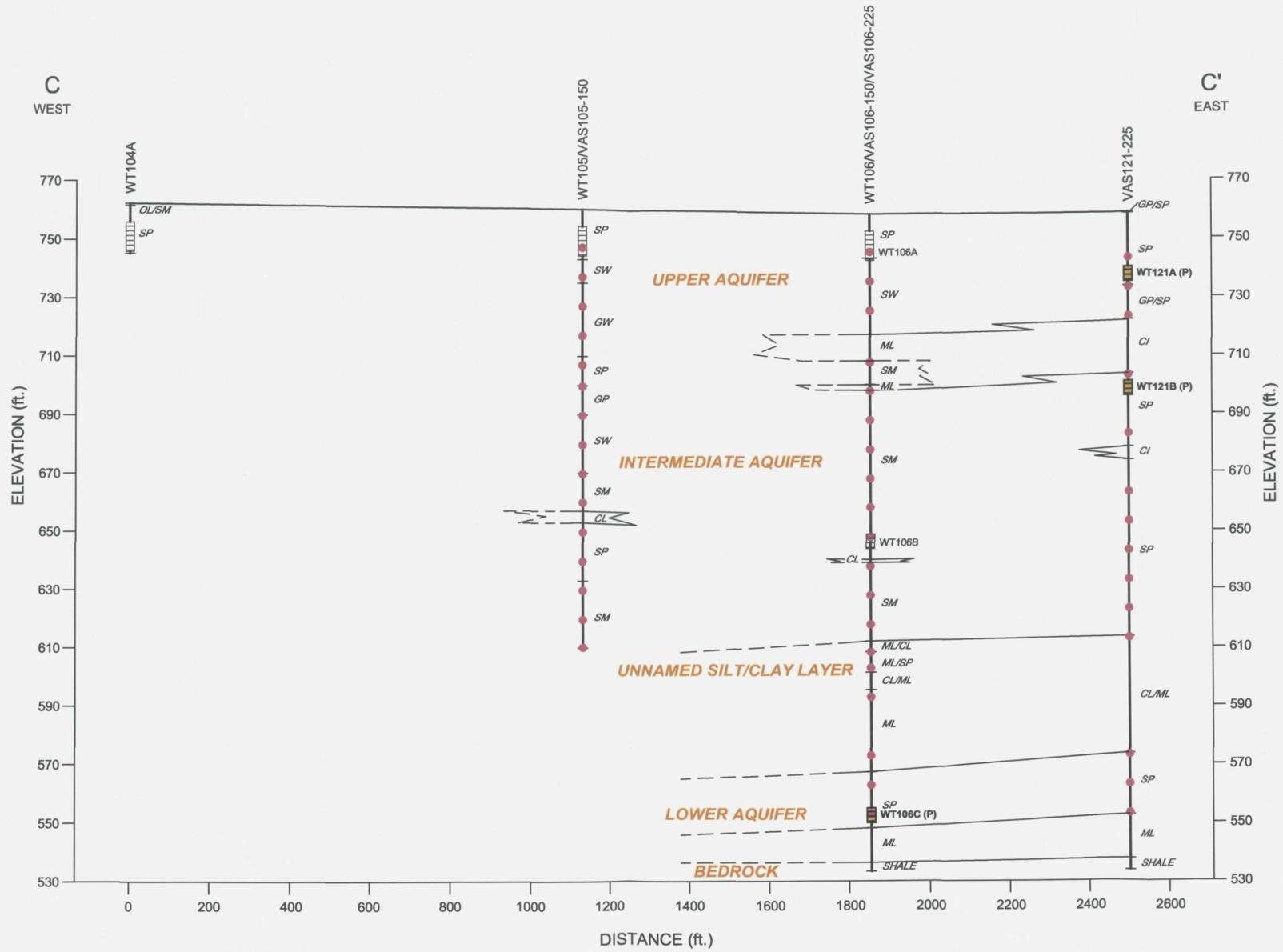


figure 7.3

PROPOSED MONITORING WELLS CROSS SECTION C-C'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA039 OCT 27/2010

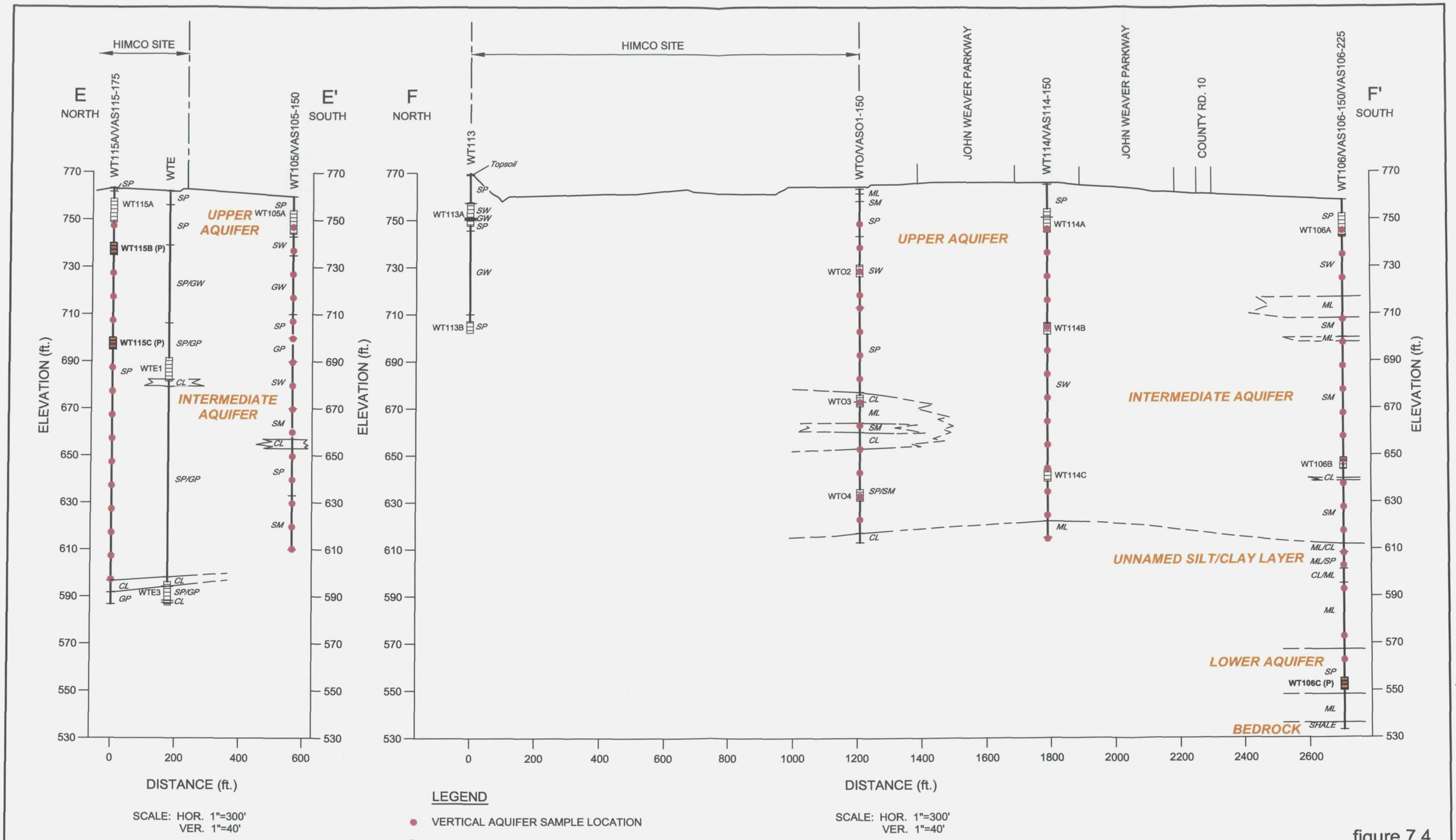


figure 7.4

PROPOSED MONITORING WELLS CROSS SECTIONS E-E' AND F-F'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA039 OCT 27/2010

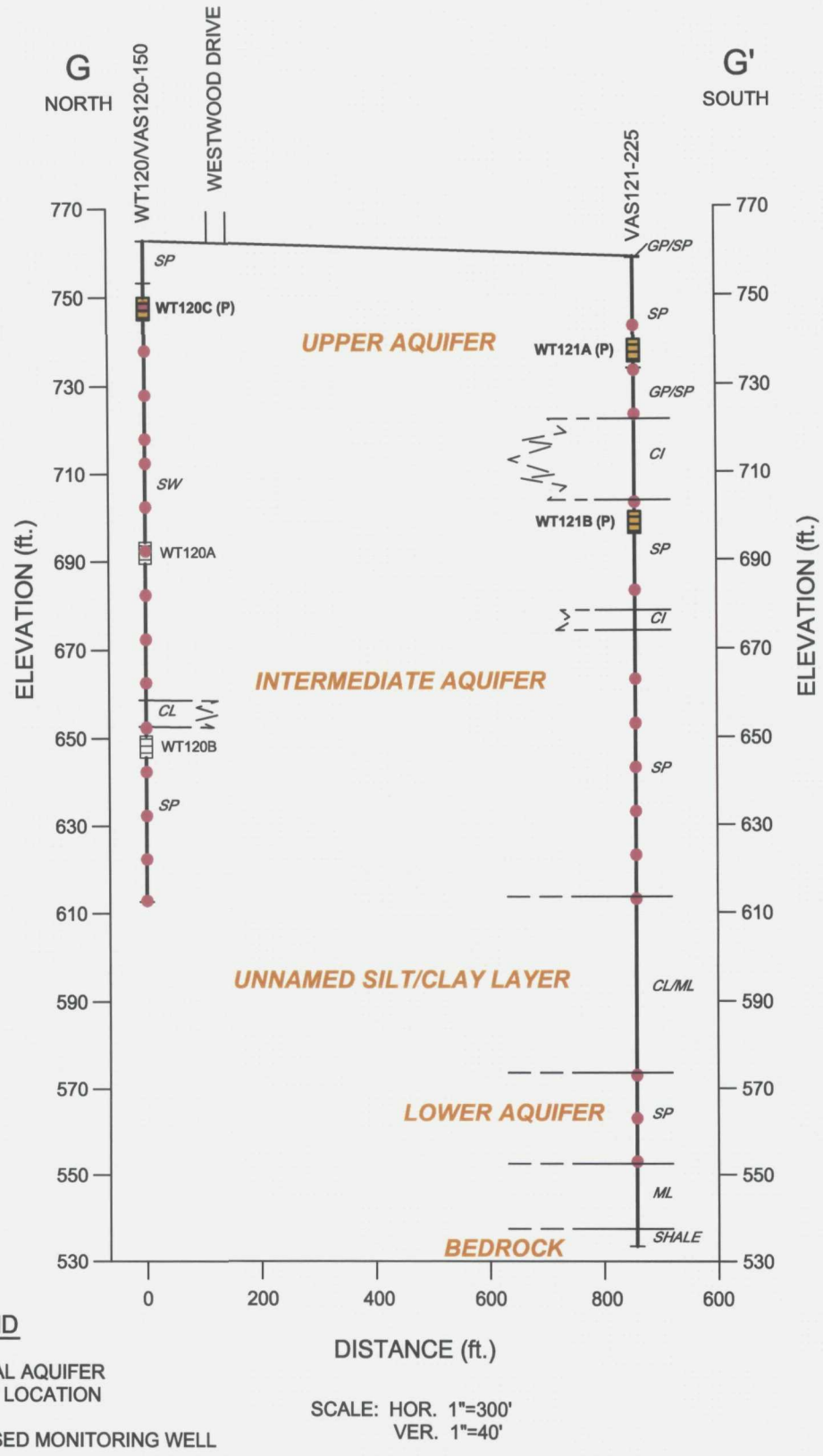


figure 7.5

PROPOSED MONITORING WELLS CROSS SECTION G-G'
HIMCO SITE
Elkhart, Indiana

39611-00(029)GN-WA039 OCT 27/2010

TABLES

TABLE 2.1

MONITORING WELL STATUS REPORT
HIMCO SITE
ELKHART, INDIANA

Well ID	*Status*	*Installation Date*	*Screen Length* (ft)	*Material*	*Casing Diameter* (inches)	*Installed Depth* (ft bgs)	*Reference Elevation* (ft AMSL)	*Ground Surface* (ft AMSL)	*Top of Well Screen* (ft AMSL)	*Bottom of Well Screen* (ft AMSL)	*Aquifer Designation*	*Northing*	*Easting*
UPPER AQUIFER WELLS (760 - 710 ft AMSL)													
WT101A	Functional	11/12/1990	10.00	Stainless Steel	2	16.3	763.87	761.53	755.23	745.23	Upper	2351887.26	235722.25
WT102A	Functional	11/10/1990	10.00	Stainless Steel	2	16.0	768.50	766.19	760.19	750.19	Upper	2355111.73	234055.37
WT103A	Functional	11/11/1990	10.00	Stainless Steel	2	16.0	760.11	757.60	751.60	741.60	Upper	2352799.65	233645.99
WT104A	Functional	11/12/1990	10.00	Stainless Steel	2	16.3	765.01	762.32	756.02	746.02	Upper	2351753.99	234123.86
WT105A	Functional	11/10/1990	10.00	Stainless Steel	2	16.0	762.37	760.07	754.07	744.07	Upper	2351430.59	235211.48
WT106A	Functional	11/9/1990	10.00	Stainless Steel	2	16.3	760.63	758.46	752.16	742.16	Upper	2351184.52	235885.61
WT111A	Functional	9/10/1991	10.00	Stainless Steel	2	20.0	766.00	764.30	754.30	744.30	Upper	2352165.35	234465.00
WT112A	Functional	8/23/1995	10.00	PVC	2	15.4	765.28	763.71	758.31	748.31	Upper	2353912.48	234933.96
WT113A	Functional	8/10/1995	10.00	PVC	2	21.7	771.27	769.32	757.62	747.62	Upper	2353866.00	235898.24
WT114A	Functional	8/21/1995	10.00	PVC	2	22.0	768.62	766.82	754.82	744.82	Upper	2352102.29	236069.62
WT115A	Functional	8/22/1995	10.00	PVC	2	17.4	765.48	763.28	755.88	745.88	Upper	2351932.43	235367.05
WT116A	Damaged	8/17/1995	10.00	PVC	2	12.6	763.35	761.30	758.70	748.70	Upper	2352184.92	234891.00
WT117A	Functional	8/15/1995	10.00	PVC	2	15.5	766.70	764.66	759.16	749.16	Upper	2352463.27	234015.45
WT117C	Functional	5/6/2010	5.00	PVC	2	28.0	766.53	763.74	740.74	735.71	Upper	2352476.42	234005.49
WT119A	Damaged	10/14/1998	10.00	PVC	2	17.5		Not Surveyed			Upper	Not Surveyed	
WT119B	Functional	5/10/2010	10.00	PVC	2	18.0	762.62	760.32	752.32	742.32	Upper	2351888.96	234845.50
WTB2	Damaged	11/3/1977	10.00	Black Steel	2	11.9	762.70	760.82	758.92	748.92	Upper	2353858.07	234068.99
WTO1	Destroyed	5/1/1979	5.00	PVC	2	30.0		Not Surveyed			Upper	Not Surveyed	
WTO2	Functional	5/5/2010	5.00	PVC	2	37.0	765.95	763.15	731.15	726.15	Upper	2352659.27	235970.66

TABLE 2.1

MONITORING WELL STATUS REPORT
HIMCO SITE
ELKHART, INDIANA

Well ID	Status	Installation Date	Screen Length (ft)	Material	Casing Diameter (inches)	Installed Depth (ft bgs)	Reference Elevation (ft AMSL)	Ground Surface (ft AMSL)	Top of Well Screen (ft AMSL)	Bottom of Well Screen (ft AMSL)	Aquifer Designation	Northing	Easting
INTERMEDIATE AQUIFER WELLS (710 - 610 ft AMSL)													
WT101B	Functional	12/14/1990	5.00	Stainless Steel	2	98.0	763.70	761.28	668.28	663.28	Intermediate	2351874.60	235726.81
WT101D	Functional	5/3/2010	5.00	PVC	2	63.0	763.62	761.63	703.63	698.30	Intermediate	2351877.84	235718.22
WT101E	Functional	5/4/2010	5.00	PVC	2	123.0	763.40	761.52	643.52	638.52	Intermediate	2351861.93	235726.50
WT102B	Functional	12/2/1990	5.00	Stainless Steel	2	65.4	768.22	765.87	705.47	700.47	Intermediate	2355133.90	234051.70
WT106B	Functional	5/10/2010	5.00	PVC	2	115.0	761.53	758.71	648.71	643.71	Intermediate	2351175.05	235885.57
WT112B	Functional	8/23/1995	5.00	PVC	2	59.4	765.54	763.55	709.15	704.15	Intermediate	2353912.39	234943.21
WT113B	Functional	8/10/1995	5.00	PVC	2	67.2	771.47	769.52	707.32	702.32	Intermediate	2353861.31	235888.26
WT114B	Functional	8/22/1995	5.00	PVC	2	65.3	768.77	766.95	706.65	701.65	Intermediate	2352092.21	236067.36
WT114C	Functional	5/11/2010	5.00	PVC	2	127.0	768.87	766.14	644.14	639.14	Intermediate	2352110.84	236068.83
WT116B	Functional	8/17/1995	5.00	PVC	2	58.4	763.33	762.04	708.64	703.64	Intermediate	2352190.18	234881.80
WT117B	Functional	8/14/1995	5.00	PVC	2	61.3	766.13	764.20	707.90	702.90	Intermediate	2352463.66	234002.76
WT117D	Functional	5/6/2010	5.00	PVC	2	112.0	766.58	763.90	656.90	651.90	Intermediate	2352476.61	234013.25
WT118B	Functional	8/18/1995	5.00	PVC	2	62.5	765.99	763.56	706.06	701.06	Intermediate	2352178.19	234466.70
WT120A	Functional	5/12/2010	5.00	PVC	2	73.0	762.43	762.19	694.43	689.43	Intermediate	2352059.17	236578.58
WT120B	Functional	5/12/2010	5.00	PVC	2	117.0	762.18	762.58	650.58	645.58	Intermediate	2352065.60	236578.16
WTB3	Functional	10/17/1977	10.00	PVC	5	135.0	762.74	760.62	635.62	625.62	Intermediate	2353858.37	234077.13
WTE1	Functional	10/11/1977	10.00	PVC	5	81.0	765.21	762.54	691.54	681.54	Intermediate	2351825.29	235236.36
WTO3	Functional	5/5/2010	5.00	PVC	2	92.0	765.65	763.00	676.00	671.00	Intermediate	2352652.85	235969.84
WTO4	Functional	5/4/2010	5.00	PVC	2	132.0	765.29	762.77	635.77	630.77	Intermediate	2352646.28	235971.31
LOWER AQUIFER WELLS (610 - 275 ft AMSL)													
WT101C	Functional	12/12/1990	5.00	Stainless Steel	2	165.0	763.57	760.93	600.93	595.93	Lower	2351860.60	235732.84
WT102C	Functional	12/1/1990	5.00	Stainless Steel	2	159.5	768.65	765.94	611.44	606.44	Lower	2355123.61	234053.78
WTB1	Functional	10/6/1977	6.00	PVC	5	473.0	763.06	761.58	294.58	288.58	Lower	2353857.39	234061.79
WTB4	Functional	10/7/1977	5.00	PVC	5	173.0	761.77	760.67	592.67	587.67	Lower	2353855.62	234084.92
WTE3	Functional	10/11/1977	5.00	PVC	5	176.0	764.91	762.27	591.27	586.27	Lower	2351806.96	235231.77

TABLE 2.2

JUNE 2010 INTERIM GROUNDWATER MONITORING PROGRAM
HIMCO SITE
ELKHART, INDIANA

WT101A	WT114C[1]
WT101B	WT115A
WT101C	WT116A
WT101D[1]	WT116B[3]
WT101E[1]	WT117A
WT102A[2]	WT117B
WT102B[2]	WT117C[1]
WT102C[2]	WT117D[1]
WT103A	WT118B
WT104A	WT119B[1]
WT105A	WT120A[1]
WT106A	WT120B[1]
WT106B[1]	WTB1
WT111A	WTB3
WT112A[2]	WTB4
WT112B[2]	WTE1
WT113A[2]	WTE3
WT113B[2]	WTO2[1]
WT114A	WTO3[1]
WT114B	WTO4[1]

Notes:

(1) Phase II monitoring well. Routine groundwater sampling commenced June 2010.

(2) Property owner withdrew permission to access the well. Last sample collected in February 2

(3) Monitoring well not included in 2008 Baseline Groundwater Monitoring Program due to damage to the well, which was subsequently repaired.

TABLE 2.3

INTERIM GROUNDWATER MONITORING PROGRAM PARAMETER LIST
HIMCO SITE
ELKHART, INDIANA

Volatile Organic Compounds

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,1-Dichloropropene
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene Dibromide)
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,4-Dichlorobenzene
2,2-Dichloropropane
2-Butanone (Methyl Ethyl Ketone)
2-Chloroethyl vinyl ether
2-Chlorotoluene
2-Hexanone
2-Phenylbutane (sec-Butylbenzene)
4-Chlorotoluene
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)
Acetone
Acrolein
Acrylonitrile
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane (Methyl Bromide)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chlorobromomethane
Chloroethane
Chloroform (Trichloromethane)
Chloromethane (Methyl Chloride)
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Cymene (p-Isopropyltoluene)
Dibromochloromethane
Dichlorofluoromethane
Ethyl Ether
Ethylbenzene
Hexachlorobutadiene
Isopropylbenzene
m&p-Xylene
Methylene chloride
Naphthalene
n-Butylbenzene
n-Propylbenzene
o-Xylene
Styrene
tert-Butylbenzene
Tetrachloroethene
Toluene
Total VOCS
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Trichlorofluoromethane (CFC-11)
Vinyl acetate
Vinyl chloride
Xylene (total)

TABLE 2.3

INTERIM GROUNDWATER MONITORING PROGRAM PARAMETER LIST
HIMCO SITE
ELKHART, INDIANA

Semi-Volatile Organic Compounds

1,2,4-Trichlorobenzene
1,2-Dichlorobenzene
1,2-Diphenylhydrazine
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2(3H)-Benzothiazolone
2,2'-oxybis(1-Chloropropane) (bis(2-chloroisopropyl) ether)
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methylphenol
2-Nitroaniline
2-Nitrophenol
3,3'-Dichlorobenzidine
3-Nitroaniline
4,6-Dinitro-2-methylphenol
4-Bromophenyl phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl phenyl ether
4-Methylphenol
4-Nitroaniline
4-Nitrophenol
Acenaphthene
Acenaphthylene
Aniline
Anthracene
Benzidine
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Benzoic acid
Benzyl Alcohol
bis(2-Chloroethoxy)methane
bis(2-Chloroethyl)ether
bis(2-Ethylhexyl)phthalate
Butyl benzylphthalate
Carbazole
Chrysene
Dibenz(a,h)anthracene
Dibenzofuran
Diethyl phthalate
Dimethyl phthalate
Di-n-butylphthalate
Di-n-octyl phthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
N-Nitrosodimethylamine
N-Nitrosodi-n-propylamine
N-Nitrosodiphenylamine
Pentachlorophenol
Phenanthrene
Phenol
Pyrene
Total SVOCS

TABLE 2.3

INTERIM GROUNDWATER MONITORING PROGRAM PARAMETER LIST
HIMCO SITE
ELKHART, INDIANA

Metals

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium Total
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Tin
Vanadium
Zinc

General Chemistry

Bromide
Chloride
Sulfate
Cyanide (total)

TABLE 2.4

VAS BOREHOLE GROUNDWATER SAMPLING PARAMETER LIST
HIMCO SITE
ELKHART, INDIANA

Volatile Organic Compounds

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,1-Dichloropropene
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (Ethylene Dibromide)
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,4-Dichlorobenzene
2,2-Dichloropropane
2-Butanone (Methyl Ethyl Ketone)
2-Chloroethyl vinyl ether
2-Chlorotoluene
2-Hexanone
2-Phenylbutane (sec-Butylbenzene)
4-Chlorotoluene
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)
Acetone
Acrolein
Acrylonitrile
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane (Methyl Bromide)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chlorobromomethane
Chloroethane
Chloroform (Trichloromethane)
Chloromethane (Methyl Chloride)
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Cymene (p-Isopropyltoluene)
Dibromochloromethane
Dichlorofluoromethane
Ethyl Ether
Ethylbenzene
Hexachlorobutadiene
Isopropylbenzene
m&p-Xylene
Methylene chloride
Naphthalene
n-Butylbenzene
n-Propylbenzene
o-Xylene
Styrene
tert-Butylbenzene
Tetrachloroethene
Toluene
Total VOCS
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Trichlorofluoromethane (CFC-11)
Vinyl acetate
Vinyl chloride
Xylene (total)

TABLE 2.4

VAS BOREHOLE GROUNDWATER SAMPLING PARAMETER LIST
HIMCO SITE
ELKHART, INDIANA

Metals

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium Total
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Tin
Vanadium
Zinc

General Chemistry

Bromide
Chloride
Sulfate
Cyanide (total)

TABLE 4.1

SUMMARY OF DETECTED VOCS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Sample Date: / *Parameters*	*Units*	*Primary MCL*	*Number of Exceedances*	*Percent of Exceedances*	*Number of Samples*	*Number of Detections*	*Percent of Detections*	*Minimum Detection*	*Maximum Detection*
Volatile Organic Compounds									
1,1-Dichloroethane	µg/L	--	--	--	35	11	31.4%	0.48 J	6.1
1,2-Dichloropropane	µg/L	5	0	0.00%	35	3	8.6%	0.22	0.5
1,4-Dichlorobenzene	µg/L	75	0	0.00%	35	2	5.7%	0.31	2.7
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	--	--	--	35	2	5.7%	8.9	9.7
Acetone	µg/L	--	--	--	35	1	2.9%	3.2	3.2
Benzene	µg/L	5	0	0.00%	35	6	17.1%	0.62	4.6
Carbon disulfide	µg/L	--	--	--	35	5	14.3%	0.30J	2.1
Chlorobenzene	µg/L	100	0	0.00%	35	1	2.9%	0.45	0.45
Chloroethane	µg/L	--	--	--	35	4	11.4%	1	3.4
Chloroform (Trichloromethane)	µg/L	--	--	--	35	1	2.9%	0.37	0.37
cis-1,2-Dichloroethene	µg/L	70	0	0.00%	35	9	25.7%	0.27 J	1.7
Cyclohexane	µg/L	--	--	--	35	1	2.9%	0.48	0.48
Dichlorodifluoromethane (CFC-12)	µg/L	--	--	--	35	5	14.3%	0.32	0.86
Isopropyl benzene	µg/L	--	--	--	35	2	5.7%	0.15	0.25
Trichloroethene	µg/L	5	0	0.00%	35	1	2.9%	0.66	0.66
Vinyl chloride	µg/L	2	0	0.00%	35	9	25.7%	0.41	2

Notes:

J - Estimated.
-- Not applicable.

TABLE 4.2

SUMMARY OF DETECTED SVOCS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Parameters	*Units*	*Primary MCL*	*Number of Exceedances*	*Percent of Exceedances*	*Number of Samples*	*Number of Detections*	*Percent of Detections*	*Minimum Detection*	*Maximum Detection*
Semivolatile Organic Compounds									
4-Methylphenol	µg/L	-	-	-	35	2	5.7%	1.2	3.2
Acetophenone	µg/L	-	-	-	35	2	5.7%	1.1	2J
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	6	0	0.0%	35	1	2.9%	0.98J	0.98J
Butyl benzylphthalate (BBP)	µg/L	-	-	-	35	1	2.9%	5.1	5.1
Diethyl phthalate	µg/L	-	-	-	35	1	2.9%	8.2	8.2
Di-n-butylphthalate (DBP)	µg/L	-	-	-	35	4	11.4%	0.71J	1.0
Phenol	µg/L	-	-	-	35	1	2.9%	3.1	3.1

Note:

- Not applicable.

TABLE 4.3

SUMMARY OF DETECTED METALS AND GENERAL CHEMISTRY PARAMETERS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Parameters	*Units*	*Primary MCL*	*Number of Exceedances*	*Secondary MCL*	*Number of Exceedances*	*RDA*	*Number of Exceedances*	*Number of Samples*	*Number of Detections*	*Minimum Detection*	*Maximum Detection*
Metals											
Aluminum	µg/L	-	-	50	13	-	-	35	24	19.7	36,300
Antimony	µg/L	6	0	-	-	-	-	35	10	0.14	0.62
Arsenic	µg/L	10	2	-	-	-	-	35	29	0.89	19.7
Barium	µg/L	2,000	0	-	-	-	-	35	34	18	203
Beryllium	µg/L	4	0	-	-	-	-	35	2	0.5	0.94
Cadmium	µg/L	5	0	-	-	-	-	35	2	0.8	1.4
Calcium	µg/L	-	-	-	-	250,000	3	35	35	19,600	689,000
Chromium	µg/L	100	0	-	-	-	-	35	9	2.4	35.6
Cobalt	µg/L	-	-	-	-	-	-	35	6	1.7	6.7
Copper	µg/L	1300*	0	1,000	0	-	-	35	9	6	38.5
Iron	µg/L	-	-	300	32	1,000	24	35	34	165	40,000
Lead	µg/L	15*	1	-	-	-	-	35	1	15.8	15.8
Magnesium	µg/L	-	-	-	-	-	-	35	35	3,210	70,000
Manganese	µg/L	-	-	50	26	-	-	35	34	12.3	2,270
Mercury	µg/L	2	0	-	-	-	-	35	3	0.19	0.19
Nickel	µg/L	-	-	-	-	-	-	35	9	3.4	36.1
Potassium	µg/L	-	-	-	-	-	-	35	34	800	54,100
Selenium	µg/L	50	0	-	-	-	-	35	2	4.5	5.9
Sodium	µg/L	-	-	-	-	150,000	2	35	35	2,460	200,000
Thallium	µg/L	2	0	-	-	-	-	35	2	0.18	0.2
Vanadium	µg/L	-	-	-	-	-	-	35	6	1.5	46.7
Zinc	µg/L	-	-	5,000	0	-	-	35	6	6.5	86.2
General Chemistry											
Bromide	mg/L	-	-	-	-	-	-	35	14	0.17	4.6
Chloride	mg/L	-	-	250	1	-	-	35	35	1.4	377
Cyanide (total)	mg/L	0.2	0	-	-	-	-	35	5	0.0052	0.04
Sulfate	mg/L	-	-	250	8	-	-	35	35	0.26	940

Notes:

J - Estimated.
- - Not applicable.
* - Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water.
If more than 10% of tap water samples exceed the action level, water systems must take additional steps.
For copper, the action level is 1.3 mg/L and for lead, the action level is 0.015 mg/L. The action level is discussed herein because there is no Primary MCL for lead. The action level applies to public water treatment facilities, and is included herein for discussion purposes only

TABLE 4.4

BACKGROUND VALUES
HIMCO SITE
ELKHART, INDIANA

Analyte	*Units*	*Background Value*		
		Upper Aquifer	*Intermediate Aquifer*	*Lower Aquifer*
Aluminum	µg/L	860	161	3420
Antimony	µg/L	42.2 UJ	37 U	1.89
Arsenic	µg/L	6.9 U	7.9	5.17
Barium	µg/L	75	133	346
Beryllium	µg/L	3.1 BJ	2.7 U	4.5 BJ
Cadmium	µg/L	4.6 UJ	3.05 U	1.0 U
Calcium	µg/L	275,000	86,000	122,000
Chromium (Total)	µg/L	1180	89	33.6
Cobalt	µg/L	50 U	50 U	50 U
Copper	µg/L	50.6	25 U	25 U
Iron	µg/L	7,720	1,870	4,930
Lead	µg/L	3.0 U	3.0 U	3.0 U
Magnesium	µg/L	26,700	25,300	60,100
Manganese	µg/L	712	173	570
Mercury	µg/L	0.2 U	0.20 U	0.20 U
Nickel	µg/L	146	40 U	28
Potassium	µg/L	2,830	7,790	3,260
Selenium	µg/L	6.0 UJ	5.0 U	5.0 U
Silver	µg/L	19.5	10 U	10.0 U
Sodium	µg/L	106,000	31,100	70,800
Thallium	µg/L	12.35	9.85	1.0 U
Vanadium	µg/L	50 U	50.0 U	59
Zinc	µg/L	34.1 U	34.1 U	40
Bromide	µg/L	500 U	500 U	500 U
Chloride	µg/L	258,000	55,000	71,800
Cyanide (total)	µg/L	10 U	10 U	10 U
Sulfate	µg/L	965,000	430,000	68,700

Notes:

UJ - Estimated reporting limit.
U - Analyte not detected above specified detection limit.
B - Method blank contamination.
J - Analyte was estimated.

TABLE 5.1

SUMMARY OF DETECTED VOCS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Sample Location:
Sample ID:
Sample Date:

Parameters	*Units*	*Primary MCL a*	*Number of Exceedances*	*Percent of Exceedances*	*Number of Samples*	*Number of Detections*	*Percent of Detections*	*Minimum Detection*	*Maximum Detection*
Volatile Organic Compounds									
1,1-Dichloroethane	µg/L	-	-	-	35	11	31.4%	0.48	6.1
1,2-Dichloropropane	µg/L	5	0	0.0%	35	3	8.6%	0.22	0.5
1,4-Dichlorobenzene	µg/L	75	0	0.0%	35	2	5.7%	0.31	2.7
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	35	2	5.7%	8.9	9.7
Acetone	µg/L	-	-	-	35	1	2.9%	3.2	3.2
Benzene	µg/L	5	0	0.0%	35	6	17.1%	0.62	4.6
Carbon disulfide	µg/L	-	-	-	35	5	14.3%	0.3	2.1
Chlorobenzene	µg/L	100	0	0.0%	35	1	2.9%	0.45	0.45
Chloroethane	µg/L	-	-	-	35	4	11.4%	1	3.4
Chloroform (Trichloromethane)	µg/L	-	-	-	35	1	2.9%	0.37	0.37
cis-1,2-Dichloroethene	µg/L	70	0	0.0%	35	9	25.7%	0.27	1.7
Cyclohexane	µg/L	-	-	-	35	1	2.9%	0.48	0.48
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	35	5	14.3%	0.32	0.86
Isopropyl benzene	µg/L	-	-	-	35	2	5.7%	0.15	0.25
Trichloroethene	µg/L	5	0	0.0%	35	1	2.9%	0.66	0.66
Vinyl chloride	µg/L	2	0	0.0%	35	9	25.7%	0.41	2

Notes:

J - Estimated.
- - Not applicable.

TABLE 5.2

SUMMARY OF DETECTED SVOCS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Parameters	*Units*	*Primary MCL* [a]	*Number of Exceedances*	*Percent of Exceedances*	*Number of Samples*	*Number of Detections*	*Percent of Detections*	*Minimum Detection*	*Maximum Detection*
Semivolatile Organic Compounds									
4-Methylphenol	µg/L	-	-	-	35	2	5.7%	1.2	3.2
Acetophenone	µg/L	-	-	-	35	2	5.7%	1.1	2
bis(2-Ethylhexyl)phthalate (DEHP)	µg/L	6	0	0.0%	35	1	2.9%	0.98	0.98
Butyl benzylphthalate (BBP)	µg/L	-	-	-	35	1	2.9%	5.1	5.1
Diethyl phthalate	µg/L	-	-	-	35	1	2.9%	8.2	8.2
Di-n-butylphthalate (DBP)	µg/L	-	-	-	35	4	11.4%	0.71	1
Phenol	µg/L	-	-	-	35	1	2.9%	3.1	3.1

Notes:

- Not applicable.

TABLE 5.3

SUMMARY OF DETECTED METALS AND GENERAL CHEMISTRY PARAMETERS - MONITORING WELL SAMPLES
HIMCO SITE
ELKHART, INDIANA

Parameters	*Units*	*Primary MCL a*	*Number of Exceedances*	*Secondary MCL b*	*Number of Exceedances*	*RDA c*	*Number of Exceedances*	*Number of Samples*	*Number of Detections*	*Minimum Detection*	*Maximum Detection*
Metals											
Aluminum	µg/L	-	-	50	13	-	-	35	24	19.7	36,300
Antimony	µg/L	6	0	-	-	-	-	35	10	0.14	0.62
Arsenic	µg/L	10	2	-	-	-	-	35	29	0.89	19.7
Barium	µg/L	2,000	0	-	-	-	-	35	34	18	203
Beryllium	µg/L	4	0	-	-	-	-	35	2	0.5	0.94
Cadmium	µg/L	5	0	-	-	-	-	35	2	0.8	1.4
Calcium	µg/L	-	-	-	-	250,000	3	35	35	19,600	689,000
Chromium	µg/L	100	0	-	-	-	-	35	9	2.4	35.6
Cobalt	µg/L	-	-	-	-	-	-	35	6	1.7	6.7
Copper	µg/L	1300*	0	1,000	0	-	-	35	9	6	38.5
Iron	µg/L	-	-	300	32	1,000	24	35	34	165	40,000
Lead	µg/L	15*	1	-	-	-	-	35	1	15.8	15.8
Magnesium	µg/L	-	-	-	-	-	-	35	35	3,210	70,000
Manganese	µg/L	-	-	50	26	-	-	35	34	12.3	2,270
Mercury	µg/L	2	0	-	-	-	-	35	3	0.19	0.19
Nickel	µg/L	-	-	-	-	-	-	35	9	3.4	36.1
Potassium	µg/L	-	-	-	-	-	-	35	34	800	54,100
Selenium	µg/L	50	0	-	-	-	-	35	2	4.5	5.9
Sodium	µg/L	-	-	-	-	150,000	2	35	35	2,460	200,000
Thallium	µg/L	2	0	-	-	-	-	35	2	0.18	0.2
Vanadium	µg/L	-	-	-	-	-	-	35	6	1.5	46.7
Zinc	µg/L	-	-	5,000	0	-	-	35	6	6.5	86.2
General Chemistry											
Bromide	mg/L	-	-	-	-	-	-	35	14	0.17	4.6
Chloride	mg/L	-	-	250	1	-	-	35	35	1.4	377
Cyanide (total)	mg/L	0.2	0	-	-	-	-	35	5	0.0052	0.04
Sulfate	mg/L	-	-	250	8	-	-	35	35	0.26	940

Notes:
J - Estimated.
- - Not applicable.
* - Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water.
If more than 10% of tap water samples exceed the action level, water systems must take additional steps.
For copper, the action level is 1.3 mg/L and for lead, the action level is 0.015 mg/L. The action level is discussed herein because there is no Primary MCL for lead. The action level applies to public water treatment facilities, and is included herein for discussion purposes only

TABLE 6.1

SUMMARY OF DETECTED VOCS - VAS SAMPLES
HIMCO SITE
ELKHART, INDIANA

	Units	*EPA Primary MCL*	*Number of Samples*	*Number of Detections*	*Percentage of Detections*	*Maximum Detection*	*Number of Primary MCL Exceedances*	*Percentage of Primary MCL Exceedances*
Volatile Organic Compounds								
Carbon disulfide	µg/L	-	46	41	89%	19	-	-
Toluene	µg/L	1000	46	38	83%	1.7	0	0.0%
Xylene (total)	µg/L	10,000	46	23	50%	1.7	0	0.0%
Methyl cyclohexane	µg/L	-	46	21	46%	1	-	-
Cyclohexane	µg/L	-	46	18	39%	0.7	-	-
1,1-Dichloroethane	µg/L	-	46	13	28%	7.5	-	-
Benzene	µg/L	5	46	8	17%	18	2	4.3%
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	46	6	13%	5.8	-	-
cis-1,2-Dichloroethene	µg/L	70	46	5	11%	1.4	0	0.0%
4-Methyl-2-pentanone (Methyl isobutyl ketone	µg/L	-	46	3	7%	1.1	-	-
Ethylbenzene	µg/L	700	46	3	7%	0.58	0	0.0%
Isopropyl benzene	µg/L	-	46	3	7%	0.43	-	-
Vinyl chloride	µg/L	2	46	3	7%	0.68	0	0.0%
Acetone	µg/L	-	46	2	4%	24	-	-
Chloroethane	µg/L	-	46	2	4%	0.85	-	-
Chlorobenzene	µg/L	100	46	1	2%	0.21	0	0.0%
Chloromethane (Methyl chloride)	µg/L	-	46	1	2%	1.2	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	46	1	2%	0.42	-	-
Methylene chloride	µg/L	5	46	1	2%	1.9	0	0.0%
Totals			874	193	22%		2	0.2%

Notes:

J - Estimated.

- - Not applicable.

TABLE 6.2

SUMMARY OF DETECTED METALS AND GENERAL CHEMISTRY PARAMETERS - VAS SAMPLES
HIMCO SITE
ELKHART, INDIANA

	Units	Number of Samples	Number of Detections	Percentage of Detections	Maximum Detection	Primary MCL	Number of Exceedances	Percentage of Exceedances	Secondary MCL	Number of Exceedances	Percentage of Exceedances	RDA	Number of Exceedances	Percentage of Exceedances
Metals														
Aluminum	µg/L	46	46	100.0%	326,000	-	-	-	50	46	100.0%	-	-	-
Antimony	µg/L	46	42	91.3%	6	6	0	0.0%	-	-	-	-	-	-
Arsenic	µg/L	46	46	100.0%	331	10	29	63.0%	-	-	-	-	-	-
Barium	µg/L	46	46	100.0%	2,360	2,000	1	2.2%	-	-	-	-	-	-
Beryllium	µg/L	46	20	43.5%	18	4	3	6.5%	-	-	-	-	-	-
Cadmium	µg/L	46	11	23.9%	12	5	1	2.2%	-	-	-	-	-	-
Calcium	µg/L	46	36	78.3%	4,220,000	-	-	-	-	-	-	250,000	14	30.4%
Chromium	µg/L	46	46	100.0%	5,190	100	20	43.5%	-	-	-	-	-	-
Cobalt	µg/L	46	44	95.7%	291	-	-	-	-	-	-	-	-	-
Copper	µg/L	46	42	91.3%	3,100	1300*	1	2.2%	1,000	1	2.2%	-	-	-
Iron	µg/L	46	46	100.0%	814,000	-	-	-	300	46	100.0%	1,000	46	100.0%
Lead	µg/L	46	44	95.7%	573	15*	24	52.2%	-	-	-	-	-	-
Magnesium	µg/L	46	40	87.0%	1,460,000	-	-	-	-	-	-	-	-	-
Manganese	µg/L	46	46	100.0%	19,900	-	-	-	50	46	100.0%	-	-	-
Mercury	µg/L	46	6	13.0%	1	2	0	0.0%	-	-	-	-	-	-
Nickel	µg/L	46	46	100.0%	1,830	-	-	-	-	-	-	-	-	-
Potassium	µg/L	46	44	95.7%	94,600	-	-	-	-	-	-	-	-	-
Sodium	µg/L	46	38	82.6%	201,000	-	-	-	-	-	-	150,000	2	4.3%
Thallium	µg/L	46	**18**	**39.1%**	**4**	**2**	**2**	**4.3%**	-	-	-	-	-	-
Vanadium	**µg/L**	**46**	**46**	**100.0%**	**719**	-	-	-	-	-	-	-	-	-
Zinc	µg/L	46	36	78.3%	3,240	-	-	-	5,000	0	0.0%	-	-	-
General Chemistry														
Bromide	µg/L	46	26	56.5%	5.9	-	-	-	-	-	-	-	-	-
Chloride	µg/L	46	25	54.3%	157	-	-	-	250	0	0.0%	-	-	-
Sulfate	µg/L	46	19	41.3%	234	-	-	-	250	0	0.0%	-	-	-

Notes:

J - Estimated.

- - Not applicable.

* - *Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water.*

If more than 10% of tap water samples exceed the action level, water systems must take additional steps.

For copper, the action level is 1.3 mg/L and for lead, the action level is 0.015 mg/L. The action level is discussed herein because there is no Primary MCL for lead. The action level applies to public water treatment facilities, and is included herein for discussion purposes only

APPENDICES

APPENDIX A

e:DAT (electronic data access tool)

1.0 GETTING STARTED WITH e:DAT

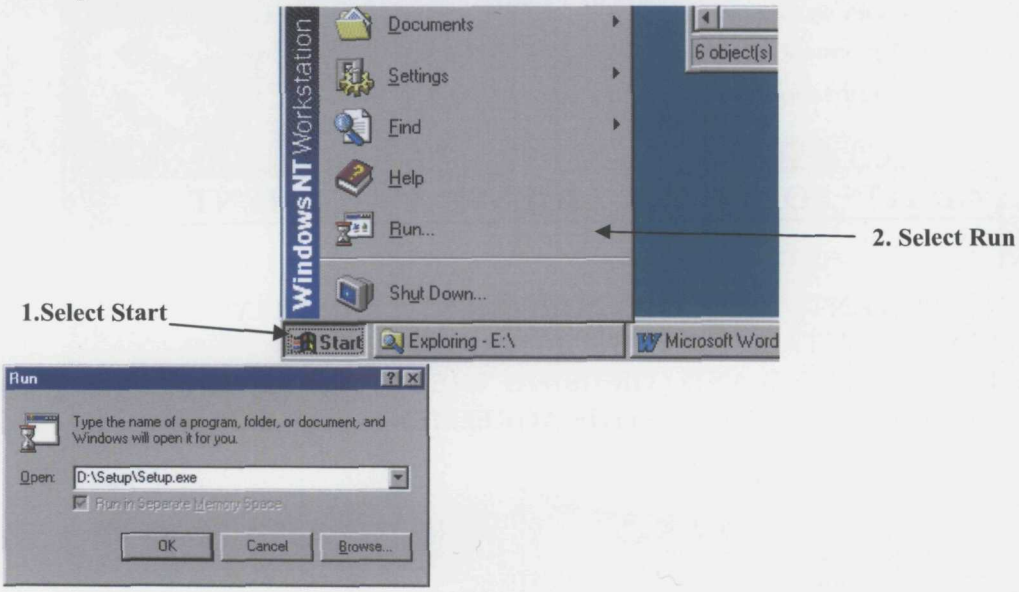
INTRODUCTION

e:DAT is a stand-alone data access tool requiring no additional database or GIS software. e:DAT provides quick and easy access to site maps and chemistry databases. Applications include environmental monitoring, air quality, municipal, and storm water projects. It is used to view both historic and current project data. Chemistry and other parameters, such as groundwater elevations, are queried by location. Query results can be returned in the form of a customizable chart, or in a tabular form. Borehole and other descriptive log figures are stored in Adobe® PDF format and viewed using the Acrobat® Reader. Site photographs are linked to site maps and are viewed through the e:DAT Photo Viewer. Executable files, such as 3-D visualizations, can be loaded and run directly from the e:DAT interface. An unlimited number of reports can be accessed from within e:DAT and viewed in Acrobat® Reader.

HOW TO INSTALL e:DAT

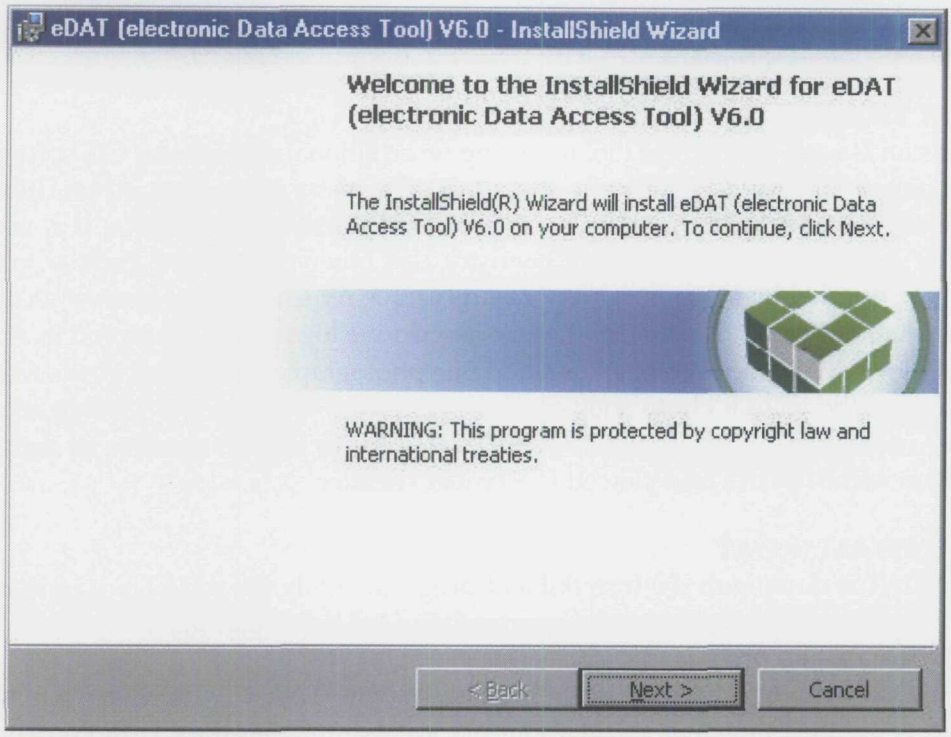
Installing e:DAT is done with the InstallShield program. Only the e:DAT program is installed, and **project data must be copied to the appropriate hard drive manually**. The following steps describe the installation process.

1. Insert the CD into the CD-ROM drive of your system. Your CD-ROM drive may be the D: or E: drive on most systems. In this example, we assume that the CD-ROM drive is the D: drive and that the program and data will be installed on the C: drive.
2. Go to the Start button on the left end of the Windows Task Bar on the bottom of your desktop. Click on Start and then Run.

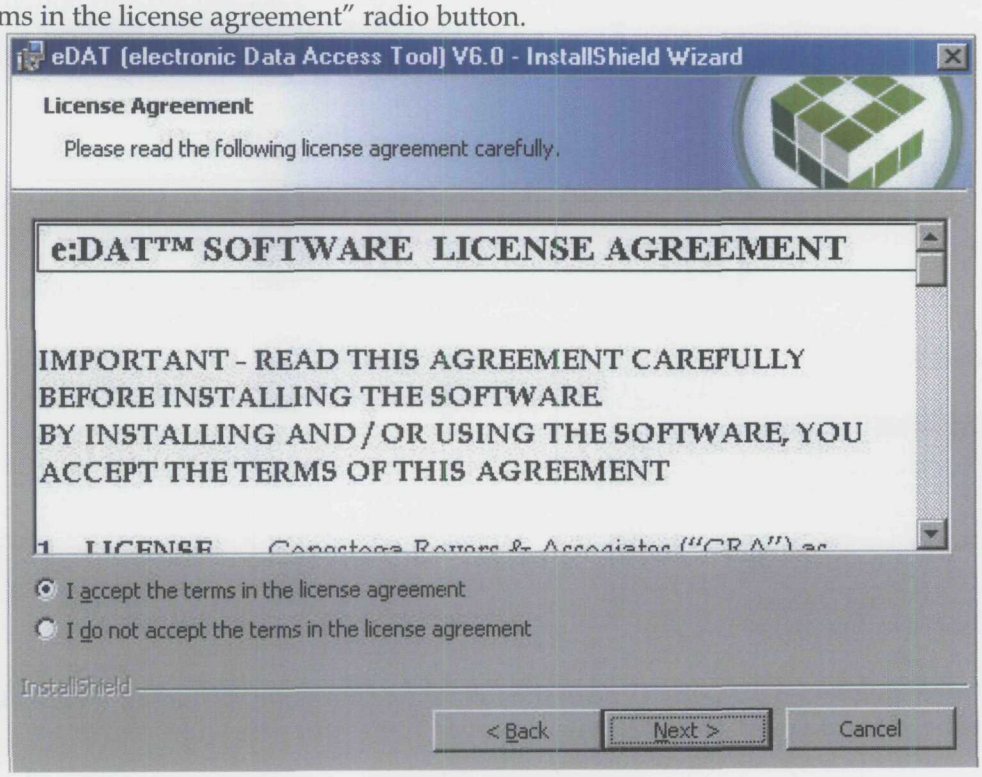


3. The Run dialog box will open. Type in the following command: **D:\setup\setup.exe**, where "D" is the letter of your CD-ROM Drive.

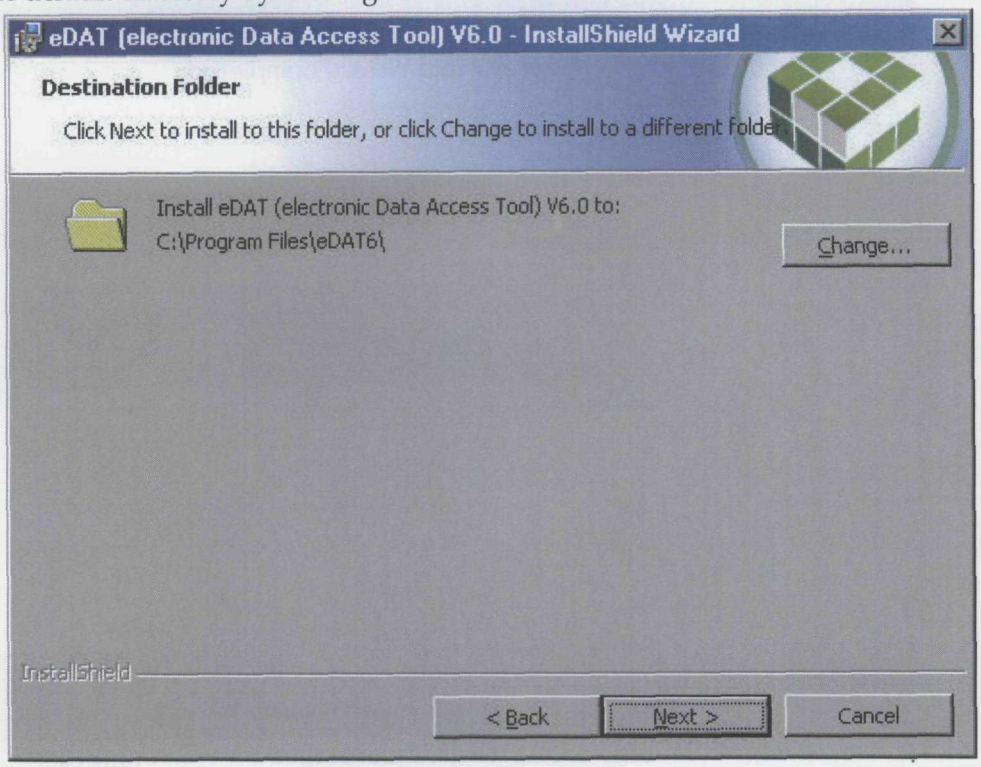
4. Press OK. The install program will begin. Press next to begin the install. Follow the instructions presented by the install program. Accept the default settings unless you have reason to change them.



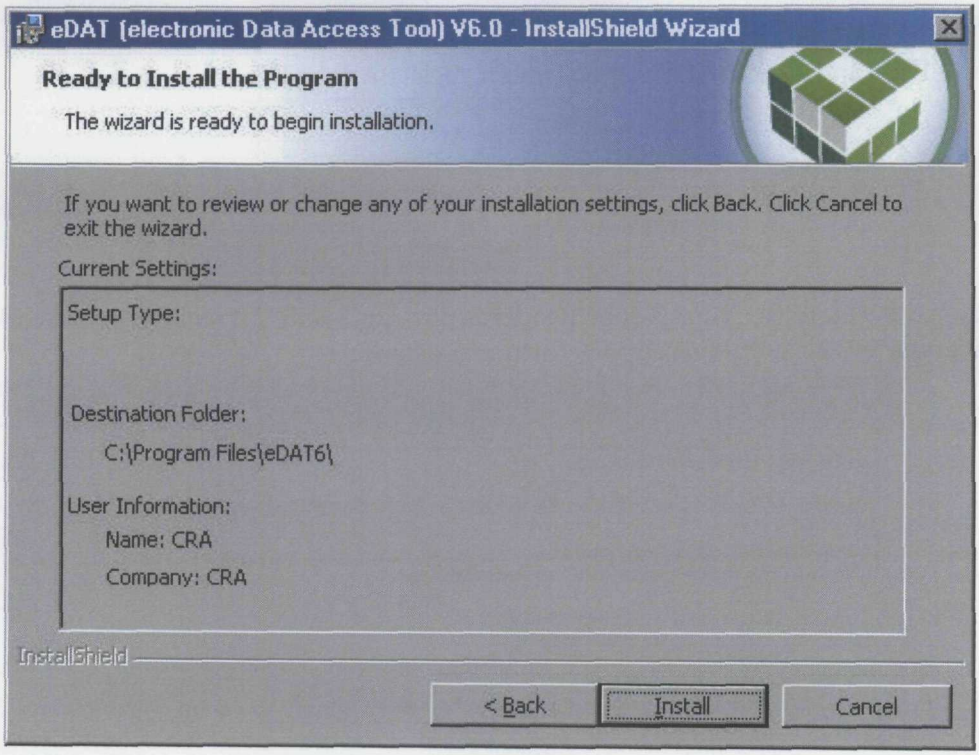
5. Read the e:DAT Software License Agreement, and accept the terms by clicking the "I accept the terms in the license agreement" radio button.



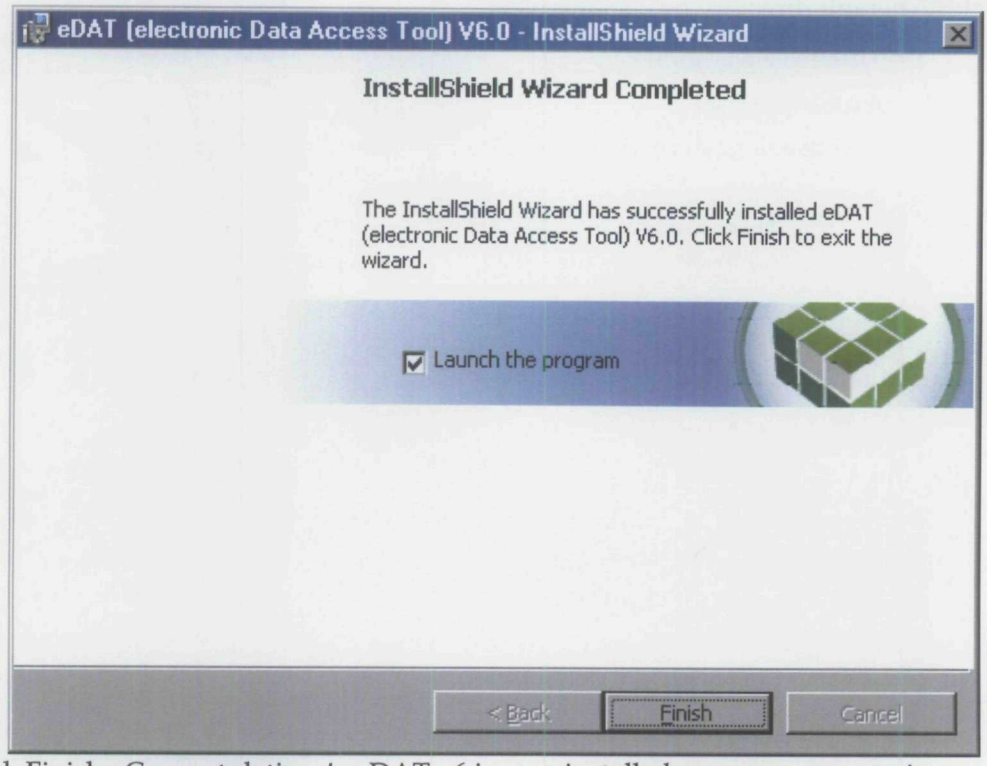
6. Choose which directory you would like to install the e:DAT software to. If you are unsure, select the default directory by clicking Next.



7. Review the settings you have selected. If you wish to change anything, use the Back arrow to step back through the install process. If you are satisfied with the settings, click Install.



8. If you wish to launch e:DAT now, ensure that the "Launch the program' checkbox is checked, and press Finish. If you do not want to start e:DAT at this time, uncheck the box

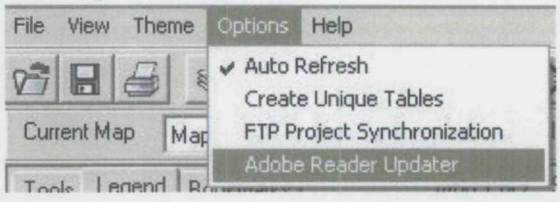


and click Finish. Congratulations! e:DAT v6 is now installed on your computer!

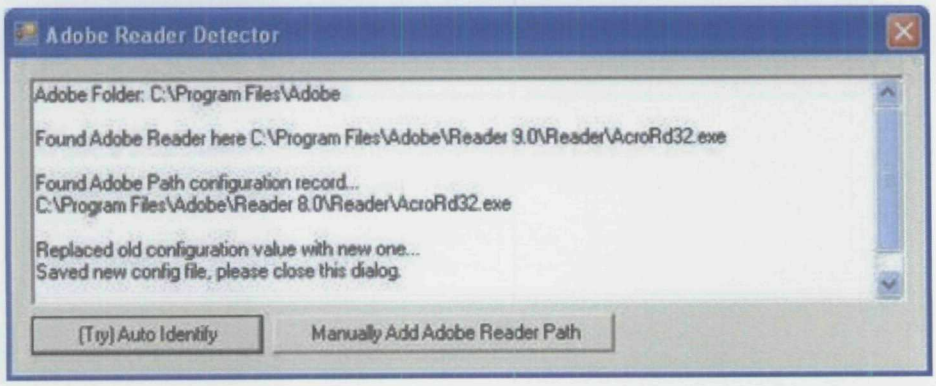
ADOBE READER UPDATER

e:DAT 6.3 works with both Adobe 8 and 9. If you have Adobe 8 your e:DAT will work normally. If you have Adobe 9 you must run the Adobe Reader Updater.

1. Open e:DAT and click on the Options menu. Select Adobe Reader Updater.

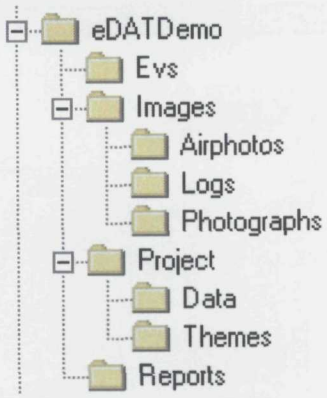


2. Click on Auto Identify. Your Adobe Reader is now updated. If it still does not work please contact your e:DAT administrator for further assistance.



DATA STRUCTURE

e:DAT is configured to show maps linked to information using a script file (*.edat) based on the Windows INI file format. Pathways to all data folders, such as images, shapefiles, and the database, are hard coded in this e:DAT script file. As the e:DAT software loads a project, it looks for the data files according to the specified pathways. If folders are rearranged and the e:DAT script file is not edited to reflect these changes, the e:DAT project will not open. The standard directory structure for an e:DAT project is illustrated below.



The e:DAT file itself is saved under the Project folder and a shortcut can be found on the root of the CD.

RUNNING e:DAT

There are two options for running an e:DAT project – directly off the CD, or off the hard drive. These instructions below assume the e:DAT software has already been installed and the user has re-started the computer.

Option 1: Running e:DAT directly off the CD

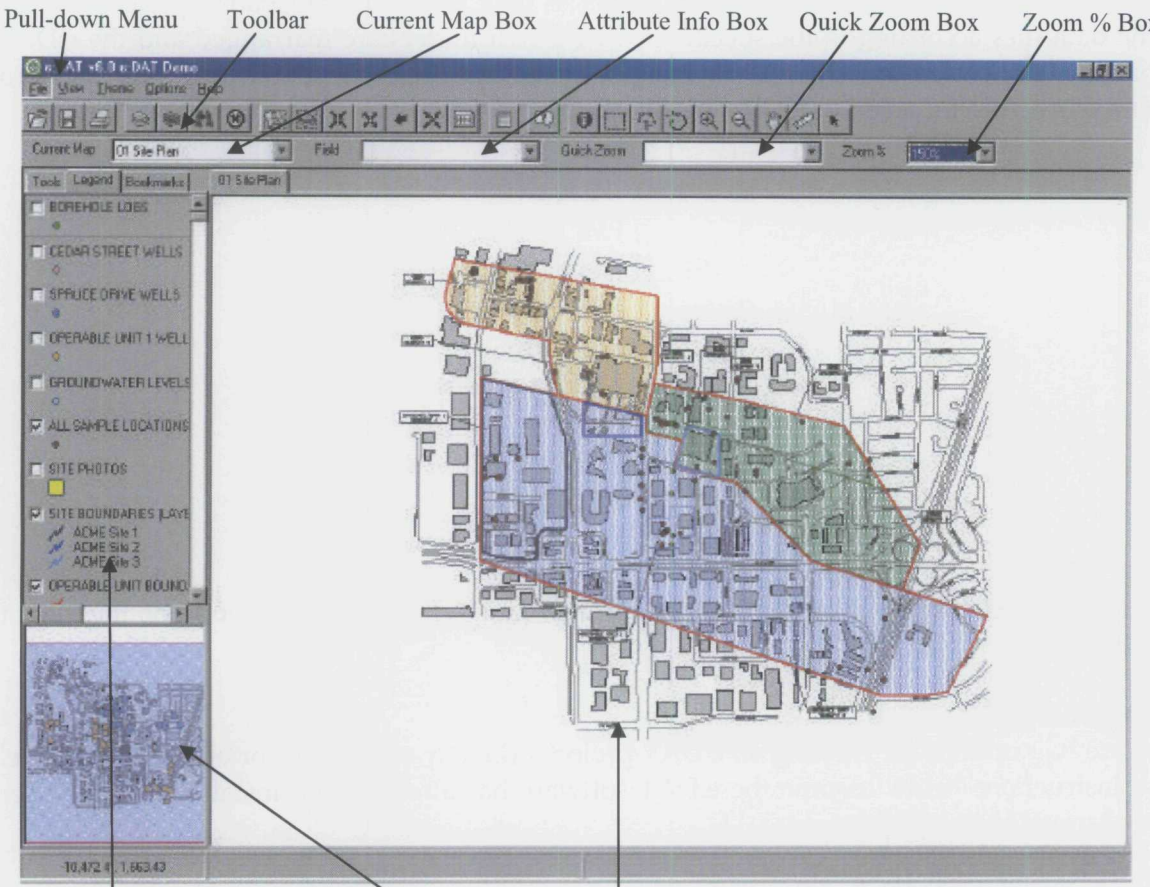
1. Running an e:DAT project off the CD is slower than from the hard drive. In addition, you will not be able to save legend settings since the e:DAT project file is running directly off the CD.
2. Click on the Start Menu -> Programs -> eDAT6 -> eDAT6. This launches the e:DAT software.
3. Select Open Project from the File Menu, and browse to the e:DAT file on the CD. For example, the file could be named edatdemo.edat.
4. Select Open, and the project file loads into the e:DAT software. e:DAT will prompt you if you would like to copy the project to the hard drive.

Option 2: Running e:DAT off the hard drive

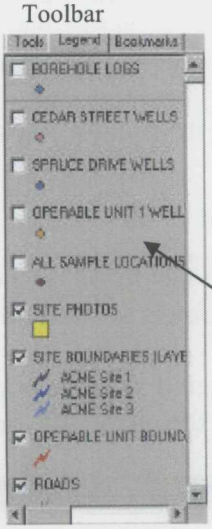
1. e:DAT automatically detects whether a project file is being opened from a CD-ROM or the hard drive. Simply choose the destination path and the project will be copied to the hard drive and run.
2. After the project has been copied to the hard drive, the CD is no longer needed anytime you need to view the project in the future. You will simply have to browse for the e:DAT file on your hard drive.

2.0 THE e:DAT INTERFACE

This section introduces various parts of the e:DAT user interface and available functions. Start e:DAT and load a project file as described in the previous section.



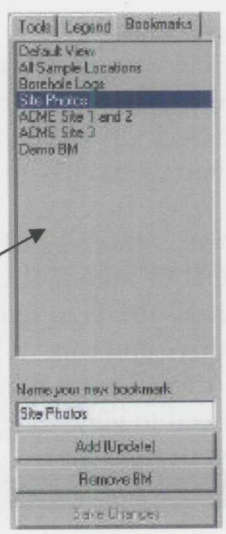
Tools and Queries Toolbar



Theme Legend*

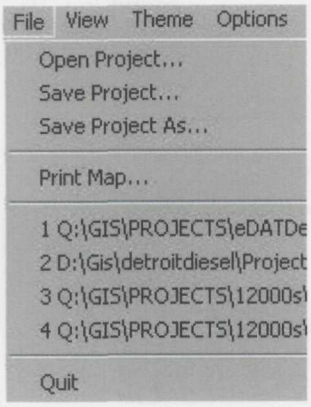
*Changing the tab at the top of Tools and Queries toolbar can bring up the map legend or bookmarked views.

Bookmarks*



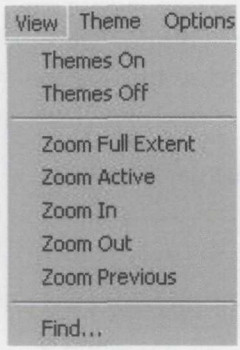
PULL-DOWN MENUS

File



- Open Project opens an e:DAT project file.
- Save Project saves the current e:DAT project file (when not running off a CD).
- Save Project As saves the current e:DAT under a different name or location.
- Print Map prints the contents of the map window. The print job will go to the default printer automatically without prompting.
- The "recent files" feature shows the 4 most recently opened e:DAT files will be displayed to shortcut the retrieval process.
- Quit closes the program and prompts the user to save the file settings.

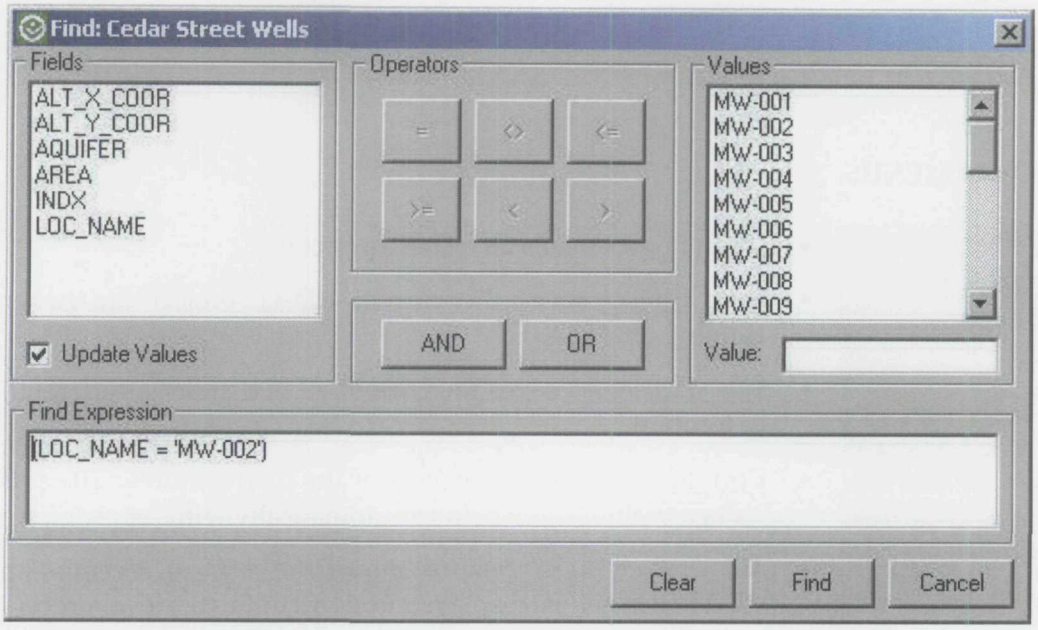
View



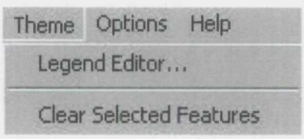
- Themes On turns on all themes in the current map.
- Themes Off turns off all themes in the current map.
- Zoom Full Extent zooms out on the current map, thereby showing the entire map area.
- Zoom Active zooms to the extent of the active theme in the current map.
- Zoom In reduces the coverage area by zooming in on the current map by a set percentage.
- Zoom Out increases the coverage area by zooming out on the current map by a set percentage.
- Zoom Previous brings the map display back to the previous extent or coverage area.
- Find brings up the Find dialog box. This feature allows the user to select features by defining a query based on their attributes.

To use the Find dialog box:

1. Select a theme to be active (i.e. Cedar Street Wells) in the map legend.
2. Select the Find option from the View Menu, or click the Find button on the top Toolbar.
3. Click an attribute field from the Fields list, then a value from the Values list, and an operator. The expression is automatically updated in the Find Expression window.
4. Click Find to perform the search. Results are highlighted with a purple box on the map.

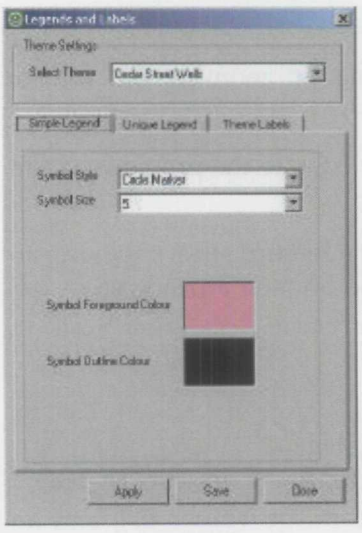


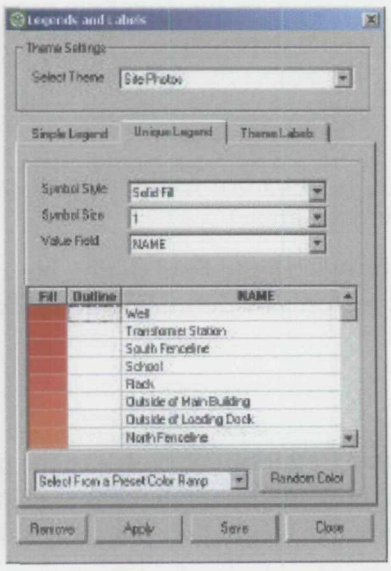
Theme

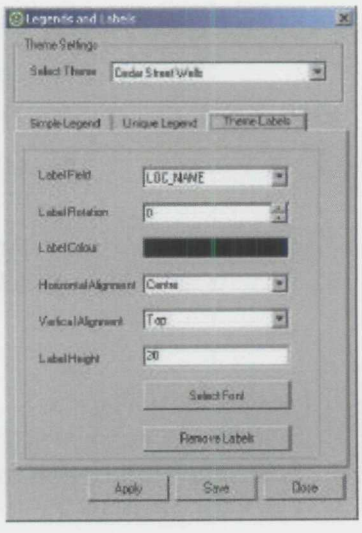


- Legend Editor opens the Legends and Labels dialog box, and displays the legend settings for the current theme in the map. This dialog box can also be opened by either double-clicking the theme in the legend, or by clicking the Legend Editor button on the top Toolbar.

- Use the Simple Legend tab to change Symbol Styles and Symbol Sizes, depending on whether the theme is a point, line, or polygon. Foreground and outline colours can be changed using the colour palettes. Click Save to write the legend and label settings to the e:DAT project file.







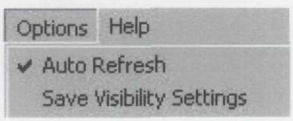
- Click the Unique Legend tab to display a theme using graduated colours. With this option features are displayed with the same symbol type, but an unlimited number of colours represent the progression of values for a data attribute specified. The

progression colours can be chosen from a preset drop down list or an automatic random colour can be selected. Using the Symbol Style, Size, and Value Field settings establishes the display properties for each theme.

- Lastly, click the Theme Labels tab to label the current theme. Select a field to be labeled, the label height, rotation, and desired colour from the label settings. Labels can be removed or saved to the e:DAT project file.

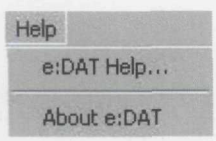
- Clear Selected Features clears the selected features of the current map, thereby returning the features to their original symbol colour and size.

Options



- Auto Refresh allows eDAT to refresh every change made to the items on the legend control, including changes in visibility and setting a theme to be the active theme. If however, auto refresh is not selected, these changes will not be applied until auto refresh is turned on again.
- Save Visibility Settings

Help



- e:DAT Help opens this eDAT Users Guide in PDF format.
- About e:DAT displays the About e:DAT screen, providing versioning and copyright information.

TOP TOOLBAR

These toolbar functions are described below:

Opens an e:DAT project file

Saves an e:DAT project file

Prints the current map view to the default printer

Turns all themes in the current map on

Turns all themes in the current map off

Opens the Find dialog box

Clears the selected features on the current map

Zooms to the full extent on the current map

Zooms to the extent of the active theme on the current map

Reduces the coverage area by zooming in on the center of the current map view by a set percentage.

Increases the coverage area by zooming out from the center of the current map by a set percentage

Brings the map display back to the previous extent or coverage area

Zoom to selected item

Opens the attribute table of the active theme

Opens the legend and labels dialog box

Opens the e:DAT User Guide.

Opens an attribute box displaying feature properties when a feature is selected on the map

Allows user to create a selection box on the map.

Allows the user to draw a polygon that intersects the features to be selected.

Allows user to select features by drawing a circle or by form with a coordinate and radius

Zooms in to a selected area on the current map, as defined by a bounding box

Zooms out from the map by a certain percentage

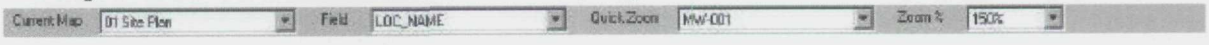
Pans or drags the map to a desired location

Measures the distance of a line segment drawn by the user on the current map

Returns mouse cursor / pointer to an arrow

MAP PULL-DOWN SETTINGS

These pull-down features establish the current map, active fields, zoom features and levels.



Use the Current Map pull-down to move between maps in the e:DAT project.

Use the Attribute Info pull-down to set an attribute field to active. Fields displayed in the pull-down change according to the active theme in the legend. When the mouse hovers over the feature on the map, the attribute for the selected field is populated on the bottom task bar.

Use the Quick Zoom pull-down to select and zoom to a feature on the current map. The selected feature will flash on the map four times.

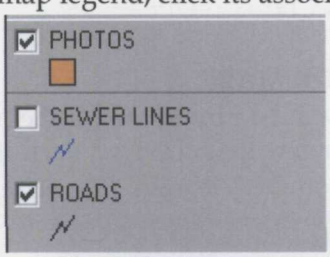
Use the Zoom % pull-down to set a specific percentage for zooming. This function works in conjunction with the Quick Zoom pull-down.

3.0 WORKING WITH MAPS

e:DAT version 6.0 allows you to load multiple maps into a project. Each map can have its own set of map layers (themes) and associated airphotos in the background. All maps in an e:DAT project file reference the same Access database. The map selection list sits above the legend.

Selecting a new map will cause the map themes in the map window to redraw and data in the list boxes to refresh. In the legend points will be represented by the colour of the theme and either a circle, square, triangle, or cross marker. Line themes are represented by the colour of the theme and one of five different line styles. Polygon themes are represented by the colour of the theme and one of eight different fill styles.

To turn a theme on or off in the map legend, click its associated check box in the legend.

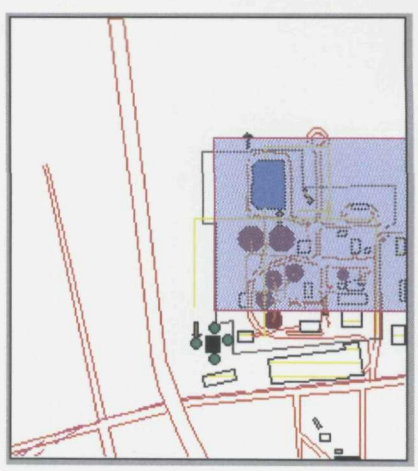


In the above example the Photos and Roads themes are displayed in the current map, but the Sewer Lines theme has been checked off. The active theme appears raised in the legend. In the above example, the Photos theme is the active theme.

A map can support multiple airphotos. If a map has associated airphotos, the airphotos are placed at the bottom of the legend and are turned off by default. To turn on an airphoto simply check the box beside its legend entry.

THE KEY MAP

The purpose of the key map is to let the user know which area of the site they are viewing when zoomed in or panning around. The key map is a replication of the main map and resides below the map legend. A rectangle with a gray fill will define on the Key Map where the user is zoomed to on the main map. It is also possible to zoom in on a map using the key map. Simply draw a box with the mouse in the key map area and the full map (to the right of the legend) will reflect the new spatial extent.



Extent of drawing shown in map window is shaded in purple/gray.

BOOKMARKS

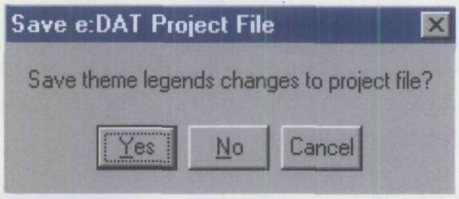
View bookmarks allow the user to quickly return to a particularly useful view. Once you have set up a desirable view (which includes turning on desired themes, zooming, map positioning) setting up, it can be bookmarked. To do so, press the bookmark tab, type in a name for the bookmark view and press the Add button to save the view. In addition bookmarks can be deleted with the remove button. If a new bookmark is named the same as an existing one, e:DAT will prompt the user if he/she wishes to overwrite the existing bookmark.

Notes:

- It should be noted that the first bookmark of each map is the default view for that particular map. It is generally recommended that the default view is not removed for this reason.
- Bookmarks can only be saved if the e:DAT file is run off a writeable disk, they cannot be used if e:DAT is running from a CD.

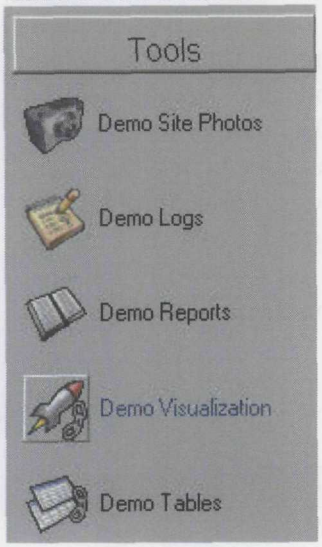
SAVING THE ON/OFF SETTINGS FOR MAPS

The user can then select which layers will be turned on/off the next time they open the project by modifying the settings and saving a new default view. Each time the user exits e:DAT after changing map properties, they are prompted to save the current on/off settings for the site maps.



4.0 OUTLOOK STYLE TOOLBAR (WITH RIGHT-CLICK FUNCTIONALITY)

CRA CUSTOMIZED TOOLS



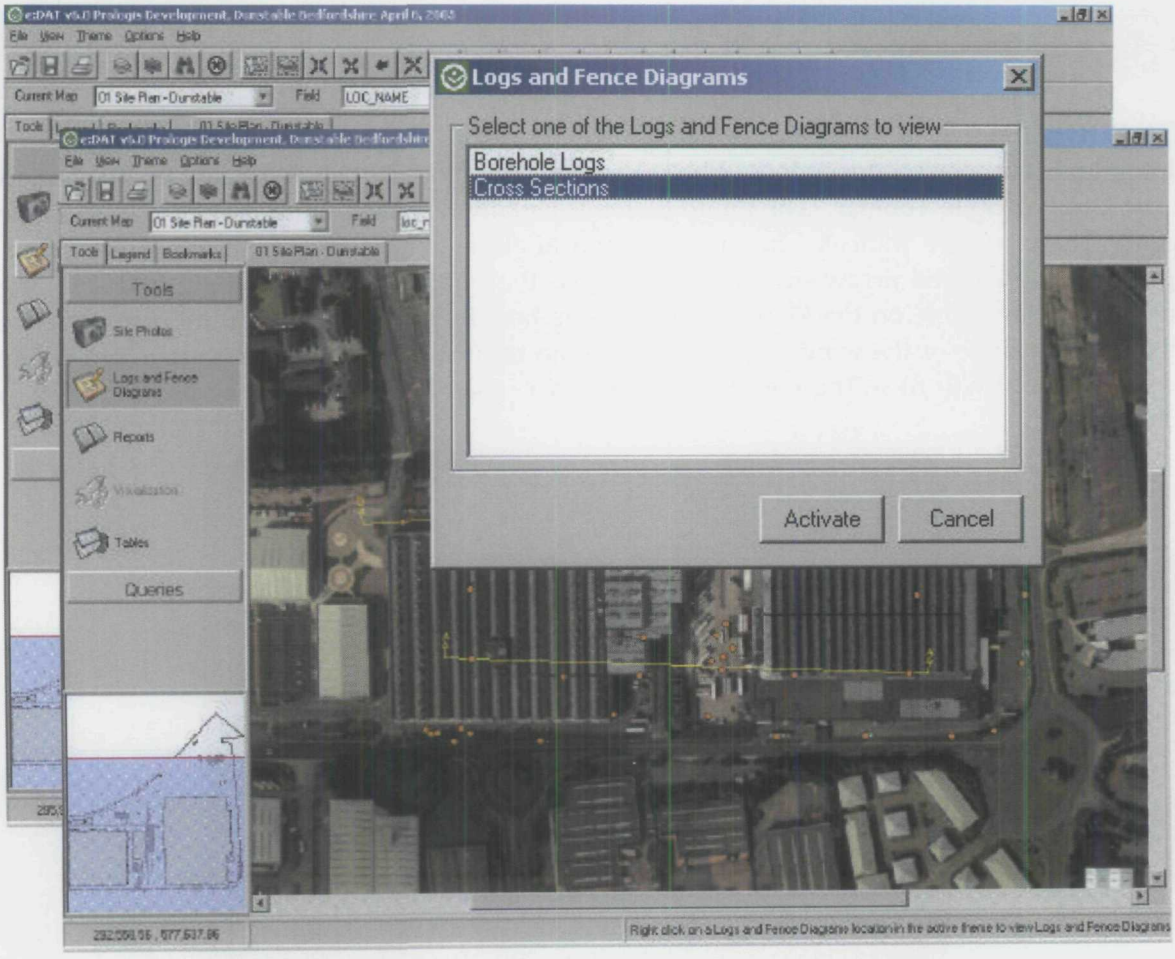
An e:DAT project can support two different menus. The first menu contains CRA customized Tools. This menu holds the Site Photos Viewer, Logs Viewer, Report Loader, a link to executable files (EVS), and a link to data tables. If the current map doesn't support Site Photos or Logs these icons are grayed out. The Site Photos and Logs tools require the user to left-click the icon on the Outlook Style Toolbar, and right-click on the map interface.

SITE PHOTOS

Photographs are viewed through the Photo Viewer. To activate left-click the Site Photos button on the Outlook Style Toolbar. The Photo theme is usually displayed with orange arrows in the legend. These arrows indicate the direction and angle at which the photograph was taken. Right-click the desired arrow on the map to open the Photo Viewer. Zooming and scrolling functions are available on the Photo Viewer dialog box. Full Size will zoom the picture to the full size (regardless of the window size) while zoom to fit will zoom the photo to a size where the entire photo will fit in the viewer window. There may be more than one photo linked to each arrow.

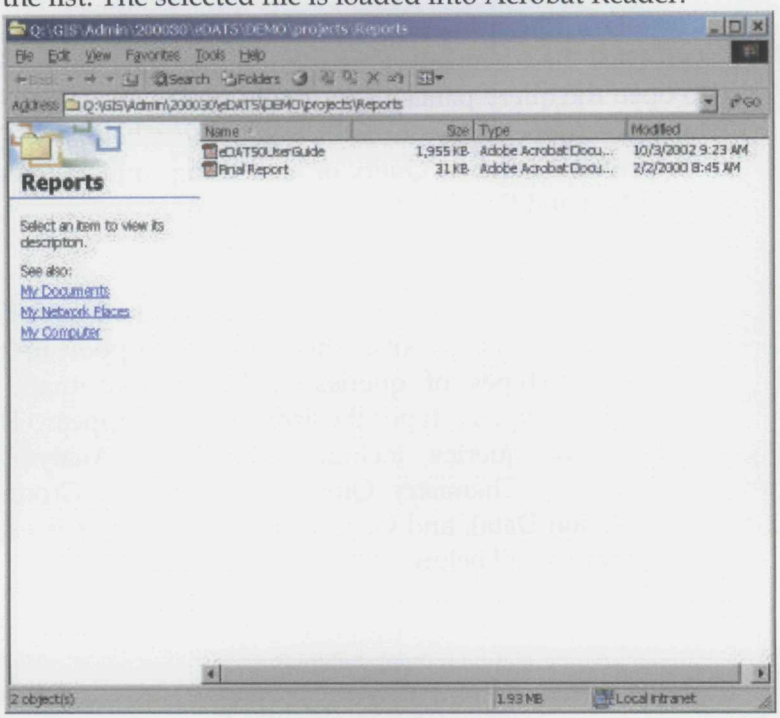
DESCRIPTIVE LOGS / CROSS SECTIONS

Descriptive logs and Cross Sections are displayed by left-clicking the Logs or Cross Sections button on the Outlook Style Toolbar. This will set the theme containing the data to be active. Right-click on a feature location, such as a cross section area or borehole, and Acrobat Reader will open a PDF file containing all the corresponding data. If the e:DAT has both Logs and Cross Sections, the dialogue both shown below with appear, letting the user pick which item they would like to view. The PDF file will move to the corresponding page. For example if you select MW-1 on the map, the PDF file will move to the page supporting logs for MW-1. If the log consists of multiple pages, the first page is loaded and the user must scroll forward to the next pages in the set. Once the PDF file is open, continue selecting locations on the map and the PDF file will move to the linked pages.



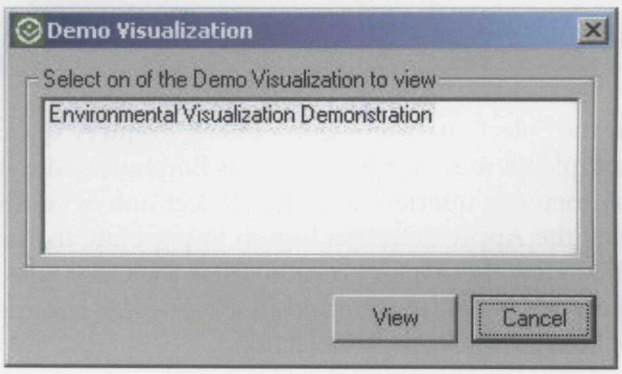
REPORTS AND PDF FILES

Left-click the Reports button on the Outlook Style Toolbar to open the Report Viewer. Select a PDF file from the list. The selected file is loaded into Acrobat Reader.



EXECUTABLE FILES

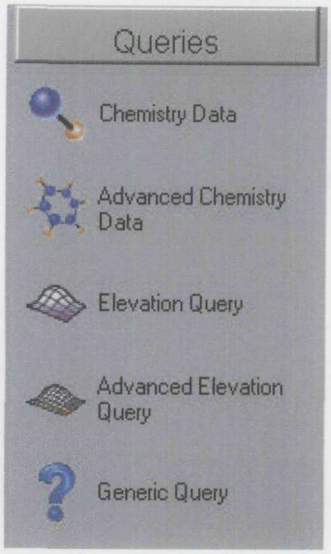
e:DAT can load project-related executable files. To enable this feature left-click the Linked Executable button on the Outlook Style Toolbar and select a file from the list in the Linked Viewable Files dialog box. The executable file will run in a program separate from e:DAT.



LINKED TABLES

Tables that e:DAT draws information from can be directly viewed by left-clicking on the Linked Tables button on the Outlook Style Toolbar and select a table from the list in the Linked Viewable Project Tables dialog box. The table will appear in the map view.

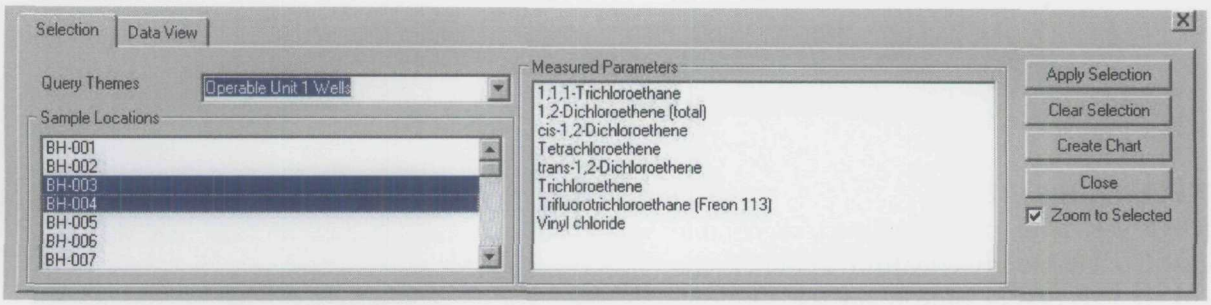
QUERYING TOOLS



Chemistry Queries

Left-click the Chemistry Query button on the Outlook Style Toolbar to open the query panel along the bottom portion of the main e:DAT interface (depending on the project, the Chemistry Query button could read Analytical Query or something similar). Two tabs appear - Selection and Data View.

The second pull-down menu on the Outlook Style Toolbar are the Querying Tools. This menu can support up to three different types of queries. If the current map doesn't support a query type, the icon will not appear. The four types of queries include: Chemistry (Analytical), an Advanced Chemistry Query, Numeric (i.e. Groundwater Elevation Data), and Generic. Each query type is explained in more detail below.



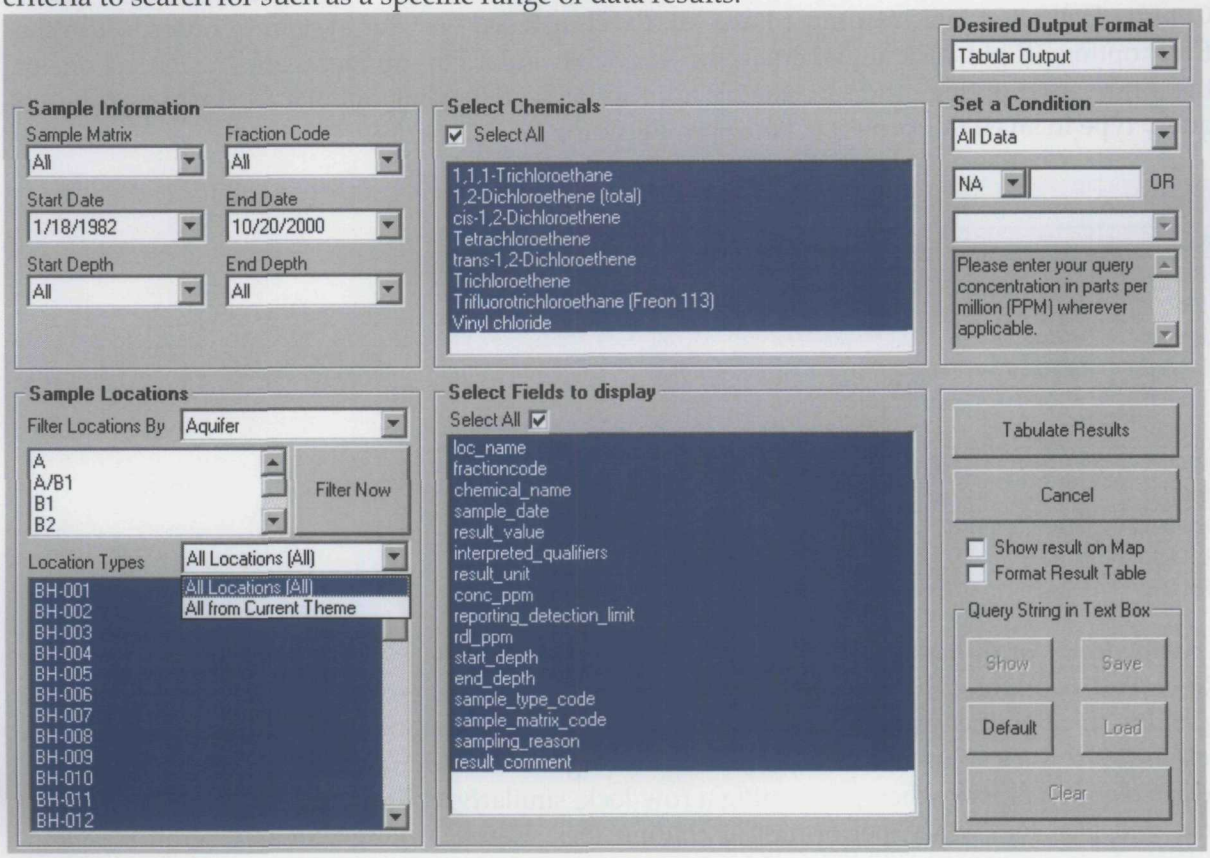
On the Selection Tab, select a theme to query. Usually an e:DAT project has been set to query multiple themes on a map, such as Boreholes, Monitoring Wells, and Geoprobes. However, only one theme is queried at a time. Select one or multiple locations from the list in the left panel. Click the Apply Selection button to populate the table with query results. Select the Data View tab to view these query results. Click the Clear Selection button to clear the data table and begin a new selection. If interested in a particular parameter, select it from the Measured Parameters list box and click Apply Selection.

In addition to selecting locations from the list in a query, one can select locations interactively via the map. Right-click and drag a box around locations, such as wells, on the map, and the query results are displayed on the Data View tab.

Advanced Chemistry Queries

e:DAT 6 has an Advanced Chemistry Query function. Left-Click on the Advanced Query Button and two additional tabs are added to the map view, Query Builder and Query Results. This query allows a more detailed or specific query than the regular Chemistry Query. In addition

to sample information such as sample matrix or sampling date, it is possible to set specific criteria to search for such as a specific range of data results.



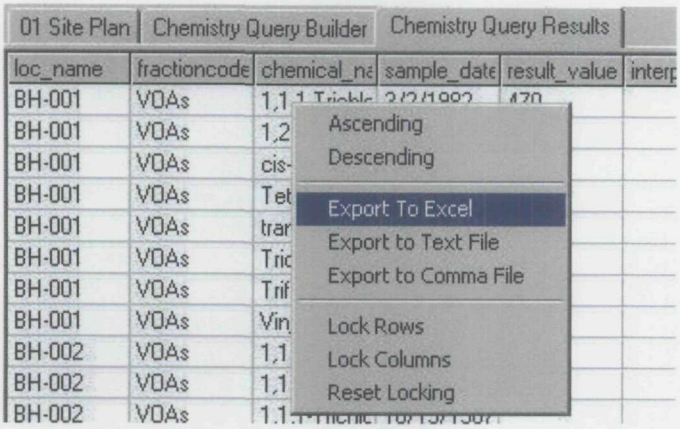
To run the Query press the Finish button. The Load Default button will reset all fields so that all the available data is displayed. The Show Query String Button will display the SQL script for the query, to hide the SQL script, click the same button (which now says Hide Query String). In the lower right corner of the Advanced Query Builder there are two check boxes, Show Result on Map and Format Result Table. Show Result on Map highlights those wells that the query found data. Format Result Table automatically increases the width of data columns in the table view to the largest entry in that field.

Sorting Records in Ascending or Descending Order

e:DAT has the ability to sort any column within the data table. Right-click a column heading (in gray) and a Pop-up menu appears. The column can be sorted either ascending or descending.

Exporting Results

The results of the query can be exported to three different file formats: Excel, Text File, or Comma Delimited File. You must have MS Excel installed on your system in order to use the Excel option. Right-click anywhere in the data table and a Pop-up menu appears. Select one of the three export options and save the file appropriately. Exporting options are the same for each query type in an e:DAT project (Chemistry, Elevation, and Generic).



Locking Rows or Columns

Rows and columns can be locked (locked rows or columns remain in the table view when scrolling through the rest of the table). To lock a row or column, move the mouse cursor over a cell in the row or column you wish to lock and right-click. All rows above and including the selected row will lock when performing a row lock, similarly, columns to the left of the locking row will also lock when performing a column lock. Reset Locking will release all row and column locks.

Elevation Queries

The second type of query on the Outlook Style Toolbar is generally referred to as an Elevation Query. Again, this name is project specific and may also be called Numeric Query. Essentially any table containing numeric fields can be queried and charted. This includes groundwater elevation data and pump flow data, for example. Run the Elevation Query in the same fashion as a Chemistry Query. Left-click the button on the Outlook Style Toolbar to open the query panel along the bottom of the e:DAT interface. Select sampling locations from either the list box or interactively via the map and mouse. The data can be sorted ascending or descending as discussed above.

Generic Queries

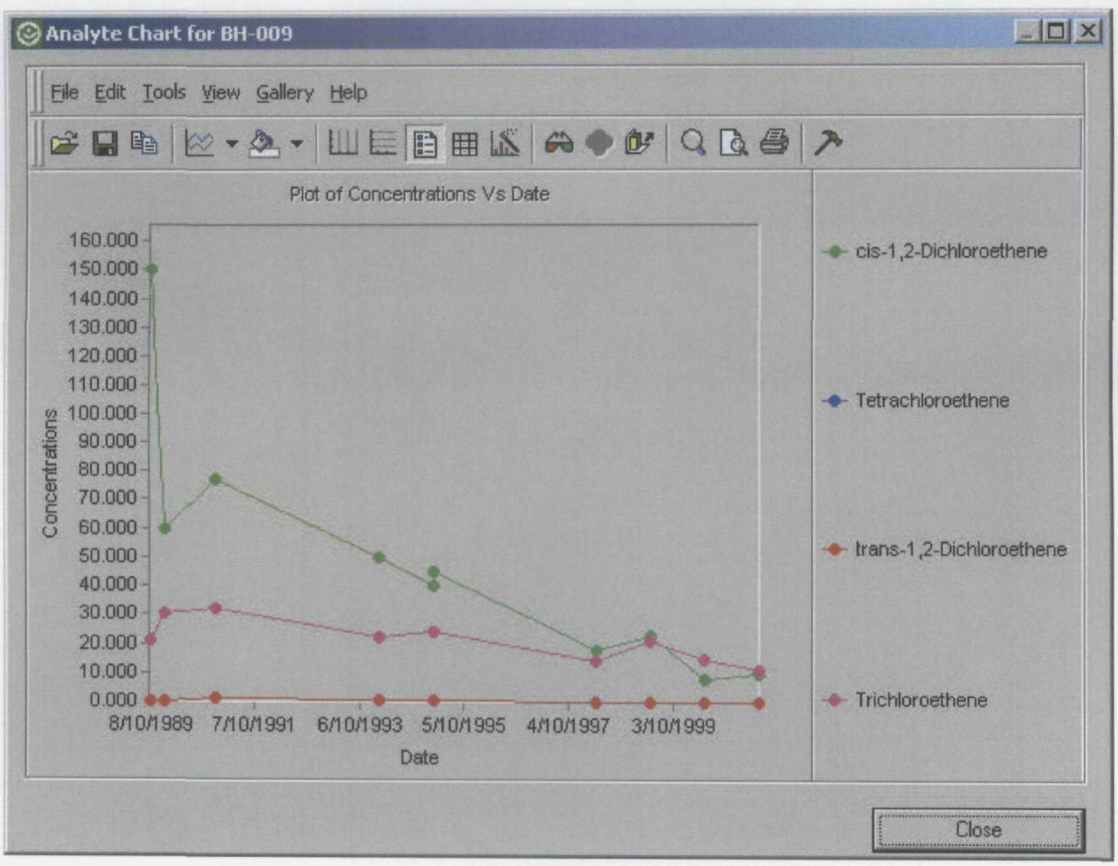
The last query type is a Generic Query. These generally display tabular data that can't be charted, such as well installation details, ownership data, and stratigraphic data. Again, left-click the button on the Outlook Style Toolbar to activate the query panel. Numerous themes can be queried, with query results being populated in the Data View table. Sorting and exporting options are the same as the Chemistry and Elevation Queries. Below is an example Generic Query result. Even though the table may contain numeric data no querying capabilities are available with these types of queries.

Selection | Data View

loc_name	alt_x_coord	alt_y_coord	Area	Aquifer
BH-004	-6754.4882	-1542.9814	OU1/SU1	A
BH-005	-6780.0802	-1418.4548	OU1/SU1	A
BH-006	-6293.1698	-1288.0913	OU1/SU1	A
BH-007	-6597.0456	-1264.9547	OU1/SU1	A
BH-008	-4500.2775	-2007.8984	OU1/SU1	B1
BH-009	-987.6624	-3237.2928	OU1/SU3	A
BH-010	-1656.1293	-4219.9072	OU1/SU3	B1
BH-011	-4074.1722	-1765.1764	OU1/SU3	A
BH-012	-4060.501	-1450.989	OU1/SU3	B1

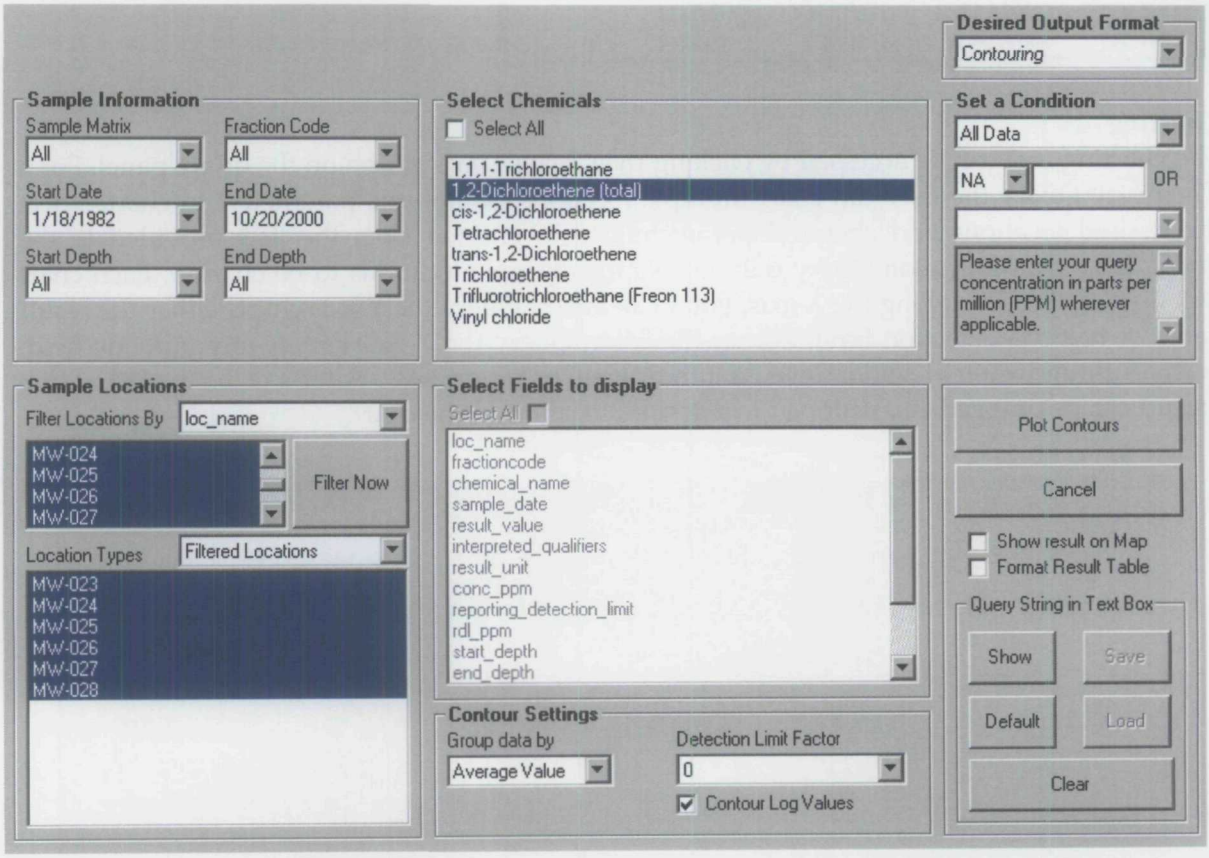
Charting

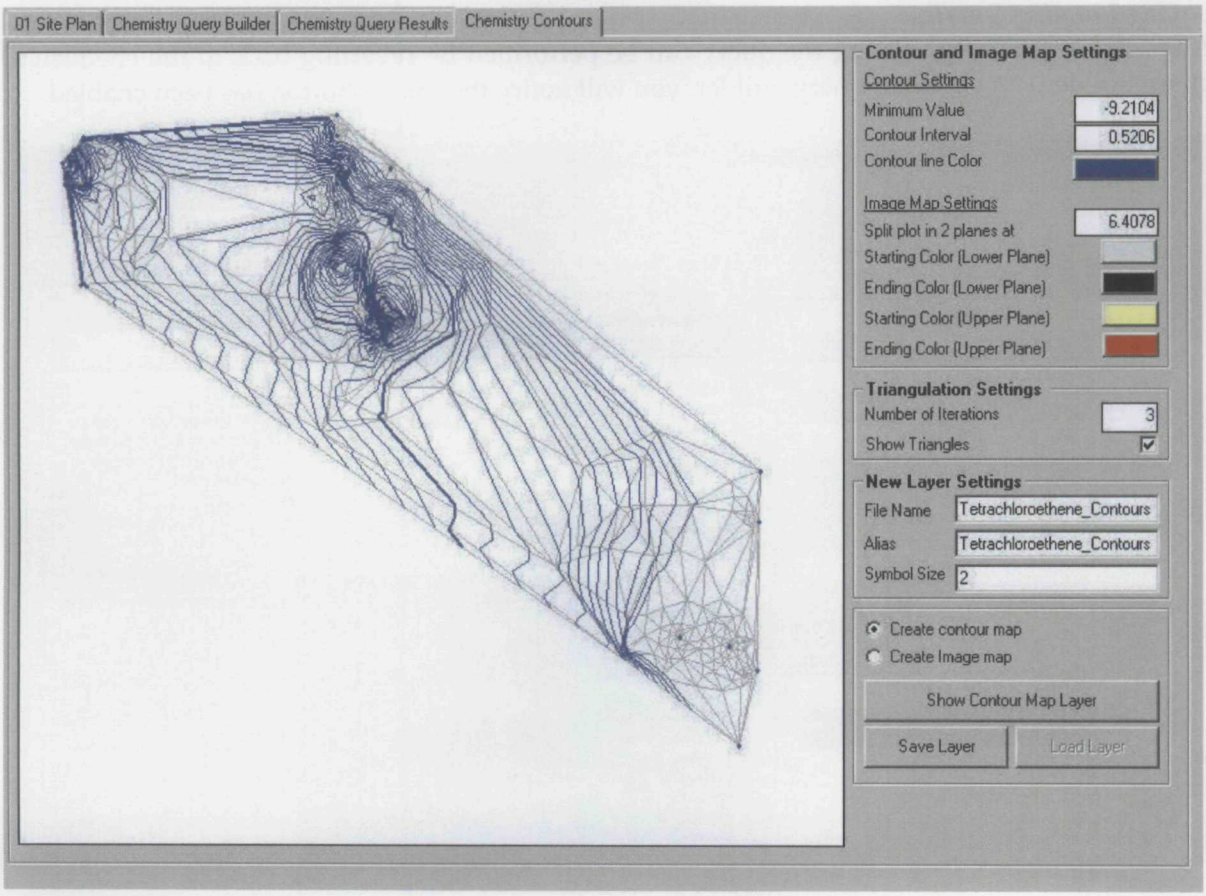
The charting tool can be accessed by clicking the Create Chart button on the query panel. For a Chemistry Query the user can chart multiple locations or multiple parameters to chart. Select the desired locations and chemical parameters to be charted from the lists provided in the dialog box. The Elevation Query only allows for multiple locations to be charted. Each chart will display the Date along the X-axis. For a Chemistry Query the Y-axis charts either the result value or half the detection limit. For an Elevation Query the Y-axis can be any numeric field, such as groundwater elevation level, depth to well, or pump flow. After a chart is created, the legend can be dragged and dropped to a desired location on the chart.



Contouring

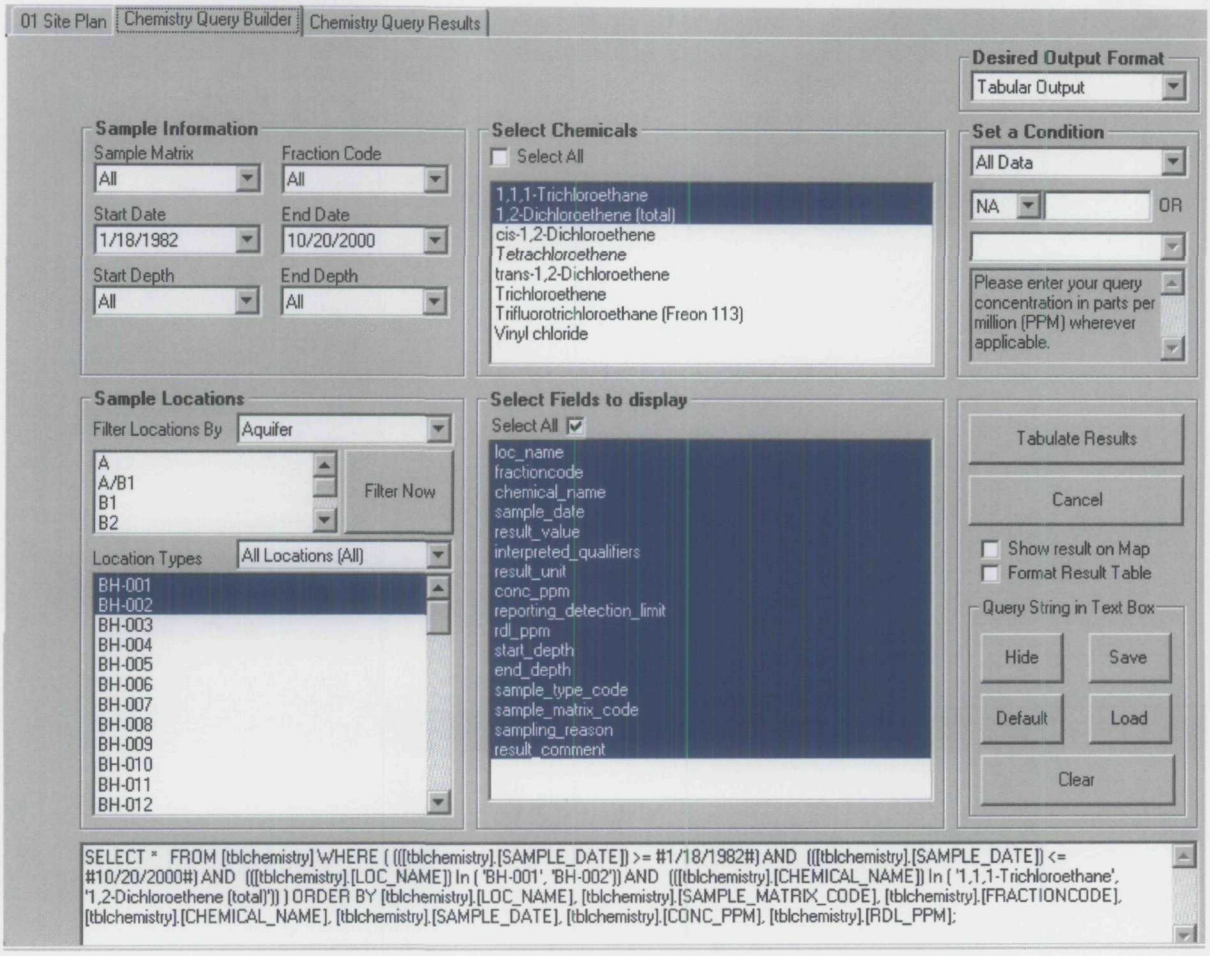
The contouring tool can be accessed by selecting contouring in the Desired Output Format pull-down menu in an Advanced Query. After selecting the point theme that you want to contour, and the desired settings, click the Plot Contours button. Once the Plot Contours button is clicked, a fourth tab will be created to hold the new contour map and a set of controls with which the contour map can be customized before loading into the current view. This set of controls allows the user to change contour settings such as contour interval, colour, etc. An Image map can also be created by clicking the Create Image map radio button, and then selecting Show Image Map Layer.

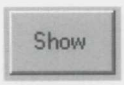



01 Site Plan
Chemistry Query Builder
Chemistry Query Results
Chemistry Contours
Contour and Image Map Settings
Contour Settings
Minimum Value
-9.2104
Contour Interval
0.5206
Contour line Color
Image Map Settings
Split plot in 2 planes at
6.4078
Starting Color (Lower Plane)
Ending Color (Lower Plane)
Starting Color (Upper Plane)
Ending Color (Upper Plane)
Triangulation Settings
Number of Iterations
3
Show Triangles
New Layer Settings
File Name
Tetrachloroethene_Contours
Alias
Tetrachloroethene_Contours
Symbol Size
2
Create contour map
Create Image map
Show Contour Map Layer
Save Layer
Load Layer

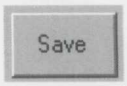
Saving/Loading Queries

After creating a query, saving the query can be performed by reverting back to the chemistry query builder. Once in the query builder, you will notice the 'show' button has been enabled.

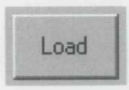




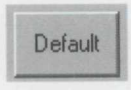
This button shows the query that has been created at the bottom of the query builder. It also enables the Save and Load buttons.



This button allows the query to be saved as a text file. The query can they be opened in any program that will recognize text files.

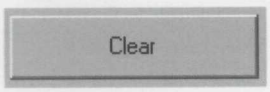


By selecting this button, the user is able to insert a query into the query builder. This query can be one either previously saved, or composed and saved as a text file in another program.



The default button will select all fields. When the default is selected, chemicals and locations still have to be selected for the query.

After selecting show, the button switches to 'hide'. When selecting this button it will hide the query string, long with the 'Save', 'Load' and 'Default' buttons.

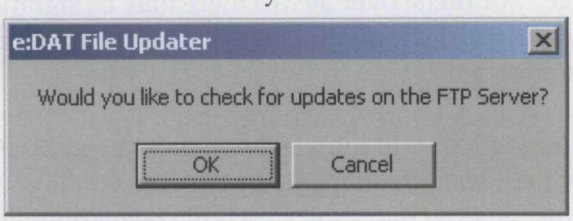


This will clear the query string box at the bottom of the screen.

PROJECT FILE UPDATE WITH FTP (FILE TRANSFER PROTOCOL)

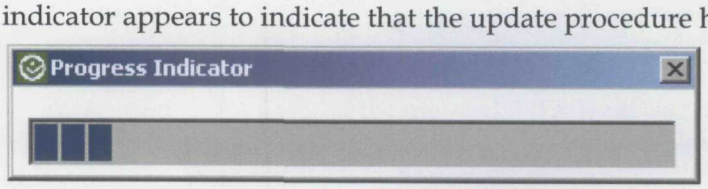
e:DAT project files can be updated using CRA's FTP site if desired by the project staff or clients. As new files are created or updated they are posted to a FTP site by e:DAT administrators, where files are stored to mimic the e:DAT project structure on your local machine. On the start of a project the e:DAT opens an internet connection, if possible, checks the FTP site for files, checks the existing files in your project folder, compares the file listing by date stamps. Then more recent files are copied from the FTP server to your local machine.

Once the project has loaded and FTP Update is enabled a messagebox asking to check for updates appears.
Click OK to check for new data.

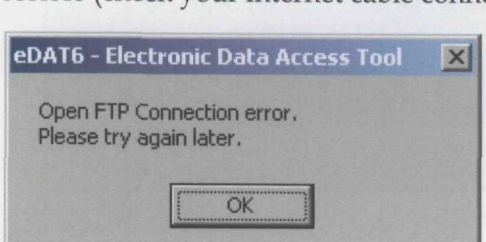


Next a Login form appears. The default parameters will not work and need to be adjusted according to parameters provided by your system administrator. Upon updating the parameters and clicking OK the new parameters are stored in the Update.mdb

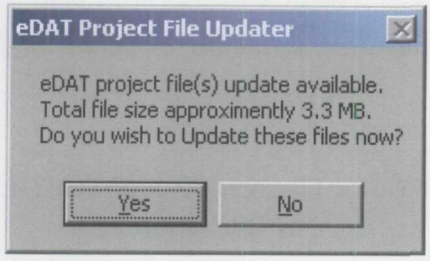
A progress indicator appears to indicate that the update procedure has started.



If a connection is not possible (check your internet cable connection) a message will appear.

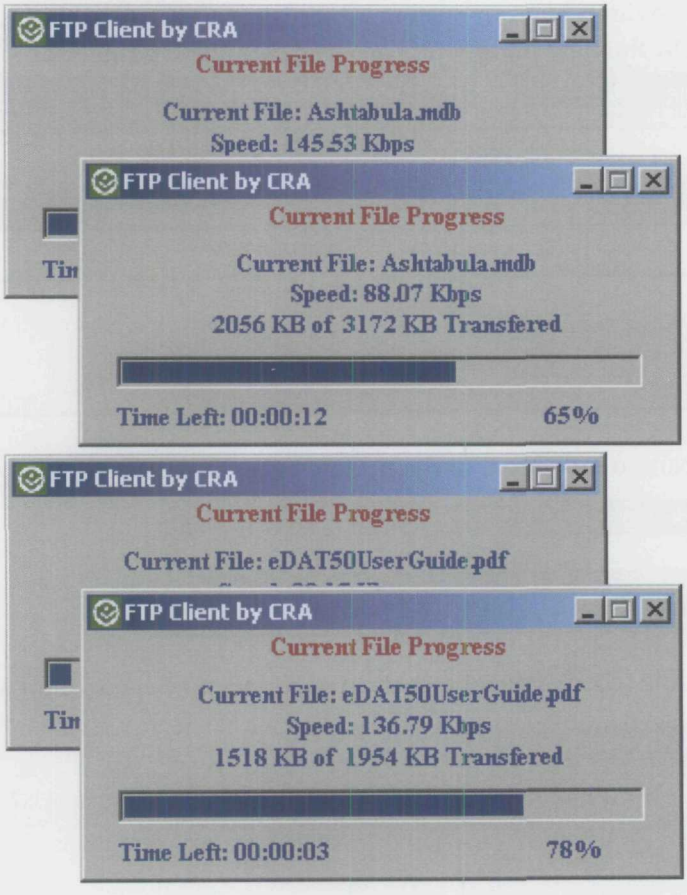


If a connection is present and successful, a message box will report the total size of the file(s) to be downloaded from the FTP site.



Selecting NO will cancel any download at this time. The files will be available next time you load the project and every time after if you do not download them.
There may be times when the size of the files may limit your computer due to the file size(s). Or there may be certain times that you may want to initiate an update if the file(s) are extremely large. For file(s) over 50 MB there may be significant time delays using the FTP method of updating files. If updating is taking too long for certain files please contact your e:DAT administrator.

Choosing YES will initiate the transfer process. All project file types can be transferred with this method (eg. ESRI shapefiles, MS Access database, PDF reports and visualizations). There is a status window that shows each file being downloaded with estimated download times.



Once the download is complete the project continues to load using the current data downloaded. The e:DAT project is now up-to-date.

HOW IT WORKS:

Essentially a file listing is collected from a Source Directory (the FTP site) and a Destination Directory (your project directory on your machine). Each list is stored in an MSAccess database that is then used to compare the two lists and generate a list of newer files on the FTP site as compared to your local project.

The database called Update.mdb is located in the data directory of the project for example: C:\Documents and Settings\username\MyDocuments\eDATProjects\ Ashtabula(12902)\ projects\project1\data.

The e:DAT project now contains 2 MDB files one for the project data (named according to project number) and the Update.mdb that is used for updating and tracking changes to the project.

On project load, the Update.mdb is opened to read tables dt_FTPConnParameters. This contains the connection and log in parameters to do the update.

ID	Site Name	FTP	Port	UserName	PassWord	Transfer	Connection
11	eDAT_Project DataUpdate	ftp.craworld.com	21	edat-test	rovers	1	1

Site Name: This is used as title for the connection static.
FTP: The FTP site to connect to, static.
Port: The port to use for transfer, FTP = 21, static.
UserName: Assigned by IT request, **unique** to each project, permissions only granted on folder basis.
PassWord: Assigned by IT request, **unique** to each project, permissions only granted on folder basis.

e:DAT then connects to CRA's FTP site using the parameters specified, if it successfully connects, then the updating procedure can begin.

Then e:DAT opens the table dt_Projects which stores project paths and project number.

ProjectNumber	Comments	ProjectName	Active	Location	Owner
12902	eDAT	Ashtabula	Yes	Waterloo	Username
SourceDirectory					
ftp.craworld.com/Ashtabula(12902)/projects/project1/					
DestinationDirectory					
C:\Documents and Settings\tvanvliet\MyDocuments\eDATProjects\Ashtabula(12902)\ projects\project1\					

The Destination Directory listing is stored in the MDB as table dt_SourceInfo_TEMP1. The table is deleted then populated with a query that compares file by name and associated date. The query is called: qry_jsv_CompareCreationDates. Another query is neccesary if the user chooses not to update at this time, records that are entered into table dt_SourceInfo are not valid since the update was cancelled and need to be rolled back to its previous state. Query del_jsv_LastCopied removes these records added to the table.

dt_SourceInfo is the ongoing log of all files transferred. If any problems occur, this table can be edited to force the update to run again. For instance, if there was an issue downloading the updated project mdb, ie 12345678.mdb, then you can delete the record from the table. Note: sort by date in descending order to get the most recent files. By deleting the record, the query will no longer recognize the previous download and will try to download that file again.

SDMS US EPA Region V

Imagery Insert Form

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APPENDIX B

TABLE OF ANALYTICAL RESULTS

SDMS US EPA Region V

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APPENDIX B FROM CD NOT INCLUDED IN THIS REPORT

APPENDIX C

LABORATORY REPORTS AND DATA VALIDATION MEMORANDA

CONESTOGA-ROVERS
& ASSOCIATES

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Indianapolis, Indiana 46278
Telephone: (317) 291-7007 Fax: (317) 328-2666
www.CRAworld.com

MEMORANDUM

TO:	Denise Quigley	REF. NO.:	039611
FROM:	Steve Day/br/14	DATE:	October 13, 2010
C.C.:	Alan Deal, Heidi Steinberg		

RE: Data Quality Assessment and Validation
Phase II Vertical Aquifer Sampling Event
Himco Site
Elkhart, Indiana

The following summarizes the data quality assessment and validation conducted for the samples collected during the vertical aquifer sampling event conducted in May and June 2010 at the Himco Site in Elkhart, Indiana. The samples identified in Table 1 were analyzed for U.S. EPA's Target Compound List (TCL) volatile organic compounds (VOCs), U.S. EPA's Target Analyte List (TAL) metals, and anions (bromide, chloride, and sulfate) by TestAmerica Laboratories, Inc. of North Canton, Ohio. The methods of analysis are presented in Table 2. The data quality evaluation criteria were established by the site-specific quality assurance project plan (QAPP).[1]

Sample Custody, Sample Receipt, and Holding Time Period Compliance

All samples were maintained properly preserved in the field staff's custody prior to being shipped to the laboratory in accordance with the requirements of the QAPP. The samples were received by the laboratory intact, properly preserved, with appropriate chain-of-custody documentation, and within the proper temperature range. All samples were prepared and analyzed within the holding time periods specified in the QAPP.

Method Blank Sample Data

Method blank sample data were evaluated to verify that analytes detected in the investigative samples were not attributable to laboratory conditions or procedures. Methylene chloride, methyl cyclohexane, 1,2,4-trichlorobenzene, and zinc were detected, generally at estimated concentrations (i.e., less than their respective reporting limits), in method blank samples associated with certain investigative samples. Investigative sample results that were qualified as non-detected for method blank contamination are presented in Table 3. The remaining method blank samples did not contain target analytes or the concentrations of target analytes in the investigative samples were greater than five times (ten times for

[1] Application of data quality evaluation criteria was consistent with the relevant criteria in "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA 540/R-99/008, October 1999 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540-R-04-004, October 2004.

common laboratory contaminants) their concentrations in the associated method blank samples. Qualification of the investigative sample data is not required in this instance.

Continuing Calibration Verification Data

The laboratory noted in its case narrative that the percent recovery of a continuing calibration verification (CCV) standard associated with the mercury analysis of several investigative samples exceeded the upper percent recovery control limit (120%). The mercury CCV data were reviewed, and the percent recovery of the CCV standard noted by the laboratory was found to be 121%. Only one investigative sample associated with this CCV standard contained mercury, which was detected at an estimated concentration (i.e., less than its reporting limit). The mercury result reported for sample GW-VAS121-060310-115-116 (0.13 µg/L) was qualified as estimated (J). Qualification of non-detected mercury results is not required in this instance.

Surrogate Compounds Data

Method performance on individual samples analyzed for VOCs was evaluated by the percent recovery data of surrogate compounds added to each sample prior to analysis. The surrogate compounds percent recovery acceptance criteria was achieved for all samples.

Laboratory Control Sample Analyses

Analytical accuracy was evaluated by percent recovery data from laboratory control sample (LCS) analyses. Duplicate laboratory control sample (LCS/LCSD) percent recovery and relative percent difference (RPD) data were evaluated to assess the accuracy and precision of laboratory sample batches without project-specific matrix spike/matrix spike duplicate (MS/MSD) samples. The LCS percent recovery and RPD data were acceptable.

Matrix Spike/Matrix Spike Duplicate Sample Analyses

Accuracy and precision relative to the sample matrix were evaluated by the percent recovery and RPD data from MS/MSD sample analyses. Certain anions and metals percent recovery data reported for four MS/MSD samples failed to achieve the acceptance criteria. Investigative sample data qualified for MS/MSD acceptance criteria violation are presented in Table 4. The remaining MS/MSD percent recovery and RPD data were acceptable or unacceptable MS/MSD data were from the analysis of MS/MSD samples that were not associated with the investigative samples.

Matrix Spike/Matrix Duplicate Sample Analyses

Accuracy and precision relative to the sample matrix for anions analyses of certain laboratory batches were evaluated by the percent recovery and RPD data from matrix spike/matrix duplicate sample analyses. All matrix spike percent recovery and matrix duplicate RPD data were acceptable or unacceptable percent recovery and/or RPD data were associated with investigative samples previously qualified for unacceptable MS/MSD data, and additional qualification was deemed to be unnecessary.

Sample Quantitation

VOC results reported at concentrations less than their respective sample-specific reporting limits but greater than or equal to their respective method detection limits were flagged by the laboratory with the "J"

qualifier. Metals and anions results reported at concentrations less than their respective sample-specific reporting limits but greater than or equal to their respective method detection limits were flagged by the laboratory with the "B" qualifier. Results flagged as such are estimated concentrations, and the data validation "J" qualifier was applied to these results during the data validation process.

Field Quality Control Sample Analyses

The field quality control samples collected during the sampling event consisted of storage tank water blanks, field equipment rinsate blank, trip blank, and field duplicate samples.

Samples were collected from the storage tank that supplied water to the VAS equipment. These samples were analyze to evaluate the quality of the water used in the sampling equipment and to determine whether or not the associated investigative sample data were affected. The source of the water in the storage tank was a fire hydrant connected to the municipal water supply, and numerous target analytes were detected in the samples collected from the water storage tank. Investigative sample results that were qualified as non-detected for storage tank water blank contamination are presented in Table 5.

The effectiveness of the field decontamination procedure was evaluated by the data from the analysis of field equipment rinsate blank samples. Analytes detected in the field equipment rinsate blank samples did not result in qualification of the investigative sample data.

Sample cross-contamination by VOCs during sample transportation and storage was evaluated by the data from trip blank samples that were submitted to the laboratory for analysis with the investigative groundwater samples. Acetone and 1,2,4-trichlorobenzene were detected in certain trip blank samples and their associated investigative samples. Investigative sample data qualified for trip blank contamination are presented in Table 6.

Field duplicate samples were collected to assess the overall precision of the sampling and analysis event. The QAPP requires evaluation of duplicate sample data when the concentrations of analytes detected in both the investigative and field duplicate samples are greater than five times their respective reporting limits. The RPDs calculated from these data are required to be within 50%. Table 7 summarizes the results of, and RPDs calculated for, the investigative and field duplicate samples that met the QAPP-specified evaluation criteria. As shown in Table 7, all RPD data were acceptable, indicating overall precision for the sampling and analysis event also was acceptable.

Completeness

Completeness, as determined by the total number of usable results versus the total number of results, was required to be 90% or greater. All data were usable, and the completeness goal was attained.

Overall Assessment

The sample data are suitable for their intended use with the qualifications noted herein.

TABLE 1

SAMPLE IDENTIFICATION NUMBERS
PHASE II VERTICAL AQUIFER SAMPLING EVENT
HIMCO SITE
ELKHART, INDIANA

GW-VAS115-051810-15-16
TRIP BLANK-051810-1
GW-VAS115-051810-25-26
GW-VAS115-051810-35-36
GW-VAS115-051810-45-46
GW-VAS115-051810-55-56
GW-VAS115-051910-65-66
W-TANK1-051910
GW-VAS115-051910-65-66-E
GW-VAS115-051910-75-76
GW-VAS115-051910-75-76-D
GW-VAS115-051910-85-86
GW-VAS115-051910-95-96
GW-VAS115-051910-105-106
GW-VAS115-051910-115-116
GW-VAS115-051910-125-126
GW-VAS115-051910-135-136
GW-VAS115-052010-145-146
TRIP BLANK-052010-2
GW-VAS115-052010-155-156
GW-VAS115-052010-175-176
GW-VAS101-052110-155-156
GW-VAS101-052110-165-166
GW-VAS101-052210-185-186
GW-VAS101-052210-195-196
GW-VAS101-052210-195-196-E
GW-VAS101-052210-205-206
GW-VAS101-052210-215-216
GW-VAS106-052410-155-156
GW-VAS106-052410-165-166
GW-VAS106-052510-185-186
GW-VAS106-052510-185-186-D
TRIP BLANK-052510-3
GW-VAS106-052510-195-196
GW-VAS106-052510-205-206
GW-VAS121-060110-15-16
TRIP BLANK-060110-4
GW-VAS121-060110-25-26
GW-VAS121-060210-35-36
GW-VAS121-060210-55-56
GW-VAS121-060210-65-66
GW-VAS121-060210-75-76
GW-VAS121-060210-85-86
GW-VAS121-060210-95-96
GW-VAS121-060210-95-96-E
GW-VAS121-060210-105-106
GW-VAS121-060310-115-116
GW-VAS121-060310-125-126
GW-VAS121-060310-125-126-D
GW-VAS121-060310-135-136
GW-VAS121-060310-145-146
GW-VAS121-060810-185-186
TRIP BLANK-060810-5
GW-VAS121-060810-195-196
W-TANK2-060910
GW-VAS121-060910-205-206

TABLE 2

SUMMARY OF ANALYTICAL METHODS
PHASE II VERTICAL AQUIFER SAMPLING EVENT
HIMCO SITE
ELKHART, INDIANA

Parameter Group/Analyte	*Preparation Method* [1]	*Analysis Method* [1]
Volatile Organic Compounds	SW-846 5030B	SW-846 8260B
Metals		
Aluminum	SW-846 3005A	SW-846 6020
Antimony	SW-846 3005A	SW-846 6020
Arsenic	SW-846 3005A	SW-846 6020
Barium	SW-846 3005A	SW-846 6010B
Beryllium	SW-846 3005A	SW-846 6010B
Cadmium	SW-846 3005A	SW-846 6010B
Calcium	SW-846 3005A	SW-846 6010B
Chromium	SW-846 3005A	SW-846 6010B
Cobalt	SW-846 3005A	SW-846 6010B
Copper	SW-846 3005A	SW-846 6010B
Iron	SW-846 3005A	SW-846 6010B
Lead	SW-846 3005A	SW-846 6010B
Magnesium	SW-846 3005A	SW-846 6010B
Manganese	SW-846 3005A	SW-846 6010B
Mercury	SW-846 7040A	SW-846 7040A
Nickel	SW-846 3005A	SW-846 6010B
Potassium	SW-846 3005A	SW-846 6010B
Selenium	SW-846 3005A	SW-846 6010B
Silver	SW-846 3005A	SW-846 6010B
Sodium	SW-846 3005A	SW-846 6010B
Thallium	SW-846 3005A	SW-846 6020
Vanadium	SW-846 3005A	SW-846 6010B
Zinc	SW-846 3005A	SW-846 6010B
Anions		
Bromide	EPA 300.0A	EPA 300.0A
Chloride	EPA 300.0A	EPA 300.0A
Sulfate	EPA 300.0A	EPA 300.0A

[1] Method references:
SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IIIB.
EPA - "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

TABLE 3

SUMMARY OF SAMPLE DATA QUALIFIED FOR METHOD BLANK CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
1,2,4-Trichlorobenzene	GW-VAS115-051910-65-66	1.0 U
Methylene chloride	GW-VAS101-052210-195-196	1.0 U
	GW-VAS115-052010-175-176	1.0 U
Methyl cyclohexane	GW-VAS121-060110-15-16	1.0 U
Zinc	GW-VAS106-052510-185-186	58.2 U
	GW-VAS106-052510-195-196	36.8 U

[1] The sample results are qualified as:
U - The material was analyzed for, but was not detected above the level of the associated value.

TABLE 4

SUMMARY OF SAMPLE DATA QUALIFIED FOR VIOLATION OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCEPTANCE CRITERIA PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Sample ID	*Analyte*	*Qualified Result* [1]
GW-VAS115-051910-115-116	Chloride	27.8 J
	Sulfate	106 J
GW-VAS106-052510-195-196	Bromide	0.20 J
GW-VAS106-052510-205-206	Antimony	0.91 J
	Arsenic	331 J
	Barium	1420 J
	Beryllium	11.0 J
	Bromide	0.60 J
	Cobalt	202 J
	Nickel	1830 J
	Silver	10.0 UJ
	Thallium	3.4 J
GW-VAS121-060310-135-136	Bromide	5.6 J
	Chloride	35.8 J

[1] The sample results are qualified as:
J - The associated value is an estimated quantity.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Bromodichloromethane	GW-VAS115-051810-15-16	3.4 U
	GW-VAS115-051810-25-26	1.0 U
	GW-VAS115-051810-35-36	1.4 U
	GW-VAS115-051910-105-106	1.0 U
	GW-VAS115-051910-115-116	1.4 U
	GW-VAS115-051910-125-126	1.5 U
	GW-VAS115-051910-135-136	4.0 U
	GW-VAS115-051910-65-66	1.0 U
	GW-VAS115-051910-75-76	1.2 U
	GW-VAS115-051910-75-76-D	1.3 U
	GW-VAS115-051910-85-86	1.2 U
	GW-VAS115-051910-95-96	4.0 U
	GW-VAS101-052210-195-196	1.0 U
	GW-VAS115-052010-145-146	1.1 U
	GW-VAS121-060110-15-16	4.2 U
	GW-VAS121-060110-25-26	1.7 U
	GW-VAS121-060210-105-106	1.0 U
	GW-VAS121-060210-55-56	1.4 U
	GW-VAS121-060210-65-66	6.0 U
	GW-VAS121-060210-85-86	1.0 U
	GW-VAS121-060310-115-116	1.0 U
	GW-VAS121-060310-135-136	1.0 U
	GW-VAS121-060310-145-146	1.0 U
Chloroform	GW-VAS115-051810-15-16	5.9 U
	GW-VAS115-051810-25-26	1.0 U
	GW-VAS115-051810-35-36	2.3 U
	GW-VAS115-051810-45-46	1.0 U
	GW-VAS115-051810-55-56	1.0 U
	GW-VAS115-051910-105-106	3.0 U
	GW-VAS115-051910-115-116	3.2 U
	GW-VAS115-051910-125-126	3.5 U
	GW-VAS115-051910-135-136	7.8 U
	GW-VAS115-051910-65-66	2.4 U

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Chloroform	GW-VAS115-051910-75-76	3.1 U
	GW-VAS115-051910-75-76-D	3.2 U
	GW-VAS115-051910-85-86	3.4 U
	GW-VAS115-051910-95-96	8.6 U
	GW-VAS101-052110-155-156	1.0 U
	GW-VAS101-052110-165-166	1.0 U
	GW-VAS101-052210-195-196	1.0 U
	GW-VAS101-052210-215-216	1.0 U
	GW-VAS106-052410-155-156	1.0 U
	GW-VAS115-052010-145-146	3.2 U
	GW-VAS115-052010-155-156	1.0 U
	GW-VAS115-052010-175-176	2.0 U
	GW-VAS106-052510-195-196	1.0 U
	GW-VAS106-052510-205-206	2.1 U
	GW-VAS121-060110-15-16	14 U
	GW-VAS121-060110-25-26	8.1 U
	GW-VAS121-060210-105-106	2.5 U
	GW-VAS121-060210-35-36	1.0 U
	GW-VAS121-060210-55-56	9.0 U
	GW-VAS121-060210-65-66	15 U
	GW-VAS121-060210-75-76	1.0 U
	GW-VAS121-060210-85-86	2.0 U
	GW-VAS121-060310-115-116	3.8 U
	GW-VAS121-060310-125-126	1.0 U
	GW-VAS121-060310-125-126-D	1.0 U
	GW-VAS121-060310-135-136	2.3 U
	GW-VAS121-060310-145-146	1.1 U
	GW-VAS121-060810-195-196	3.9 U
Dibromochloromethane	GW-VAS115-051810-15-16	1.3 U
	GW-VAS115-051810-25-26	1.0 U
	GW-VAS115-051810-35-36	1.0 U
	GW-VAS115-051910-115-116	1.0 U
	GW-VAS115-051910-125-126	1.0 U

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Dibromochloromethane	GW-VAS115-051910-135-136	1.3 U
	GW-VAS115-051910-65-66	1.0 U
	GW-VAS115-051910-75-76	1.0 U
	GW-VAS115-051910-75-76-D	1.0 U
	GW-VAS115-051910-85-86	1.0 U
	GW-VAS115-051910-95-96	1.4 U
	GW-VAS115-052010-145-146	1.0 U
	GW-VAS121-060110-15-16	1.5 U
	GW-VAS121-060110-25-26	1.0 U
	GW-VAS121-060210-55-56	1.0 U
	GW-VAS121-060210-65-66	2.3 U
Trichloroethene	GW-VAS115-051810-25-26	1.0 U
	GW-VAS115-051810-35-36	1.3 U
Calcium	GW-VAS101-052110-155-156	70100 U
	GW-VAS101-052210-185-186	76800 U
	GW-VAS106-052510-185-186	50200 U
	GW-VAS106-052510-185-186-D	48700 U
	GW-VAS106-052510-195-196	42400 U
	GW-VAS121-060310-125-126	79900 U
	GW-VAS121-060310-125-126-D	87300 U
	GW-VAS121-060310-135-136	89700 U
	GW-VAS121-060810-185-186	64300 U
	GW-VAS121-060810-195-196	92500 U
Copper	GW-VAS101-052110-155-156	25.0 U
	GW-VAS101-052210-185-186	25.0 U
	GW-VAS106-052510-185-186	25.0 U
	GW-VAS106-052510-185-186-D	25.0 U
Magnesium	GW-VAS115-051810-15-16	24200 U
	GW-VAS115-051810-25-26	30500 U
	GW-VAS106-052510-185-186	21600 U

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Magnesium	GW-VAS106-052510-185-186-D	20900 U
	GW-VAS106-052510-195-196	26600 U
	GW-VAS121-060810-185-186	28900 U
Potassium	GW-VAS106-052510-185-186	5000 U
	GW-VAS106-052510-185-186-D	5000 U
Sodium	GW-VAS115-051910-135-136	11500 U
	GW-VAS115-051910-95-96	11400 U
	GW-VAS101-052110-155-156	10500 U
	GW-VAS101-052210-185-186	6490 U
	GW-VAS101-052210-195-196	10800 U
	GW-VAS101-052210-205-206	9000 U
	GW-VAS106-052410-165-166	9570 U
	GW-VAS115-052010-155-156	6890 U
Thallium	GW-VAS115-051810-15-16	1.0 U
	GW-VAS115-051810-45-46	1.0 U
	GW-VAS115-051910-115-116	1.0 U
	GW-VAS115-051910-135-136	1.0 U
	GW-VAS115-051910-75-76	1.0 U
	GW-VAS115-051910-75-76-D	1.0 U
	GW-VAS115-051910-95-96	1.0 U
	GW-VAS106-052410-155-156	1.0 U
	GW-VAS115-052010-145-146	1.0 U
	GW-VAS115-052010-155-156	1.0 U
	GW-VAS115-052010-175-176	1.0 U
	GW-VAS106-052510-185-186	1.0 U
	GW-VAS121-060110-15-16	1.0 U
	GW-VAS121-060210-65-66	1.0 U
	GW-VAS121-060210-75-76	1.0 U
	GW-VAS121-060210-95-96	1.0 U

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Zinc	GW-VAS101-052110-155-156	30.9 U
	GW-VAS101-052210-185-186	38.7 U
	GW-VAS115-052010-155-156	49.7 U
	GW-VAS121-060210-105-106	54.2 U
	GW-VAS121-060310-125-126	55.1 U
	GW-VAS121-060310-125-126-D	55.2 U
	GW-VAS121-060310-135-136	37.0 U
	GW-VAS121-060810-185-186	24.5 U
Chloride	GW-VAS115-051810-15-16	21.2 U
	GW-VAS115-051810-35-36	21.3 U
	GW-VAS115-051910-135-136	20.1 U
	GW-VAS115-051910-95-96	19.9 U
	GW-VAS101-052110-155-156	10.3 U
	GW-VAS101-052110-165-166	4.0 U
	GW-VAS101-052210-185-186	2.4 U
	GW-VAS101-052210-195-196	12.3 U
	GW-VAS101-052210-205-206	5.9 U
	GW-VAS101-052210-215-216	16.7 U
	GW-VAS106-052410-155-156	10.1 U
	GW-VAS106-052410-165-166	1.4 U
	GW-VAS115-052010-145-146	20.1 U
	GW-VAS115-052010-155-156	3.2 U
	GW-VAS106-052510-185-186	3.3 U
	GW-VAS106-052510-185-186-D	3.6 U
	GW-VAS121-060110-15-16	20.4 U
	GW-VAS121-060210-55-56	15.7 U
	GW-VAS121-060210-65-66	19.4 U
	GW-VAS121-060310-145-146	21.3 U
	GW-VAS121-060810-185-186	11.6 U
Sulfate	GW-VAS115-051910-135-136	41.7 U
	GW-VAS115-051910-95-96	42.3 U
	GW-VAS101-052110-155-156	4.1 U

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR STORAGE TANK WATER CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Sulfate	GW-VAS101-052110-165-166	3.8 U
	GW-VAS101-052210-185-186	3.4 U
	GW-VAS101-052210-195-196	10.9 U
	GW-VAS101-052210-205-206	11.5 U
	GW-VAS101-052210-215-216	15.9 U
	GW-VAS106-052410-155-156	6.4 U
	GW-VAS106-052410-165-166	1.4 U
	GW-VAS115-052010-155-156	7.1 U
	GW-VAS115-052010-175-176	20.5 U
	GW-VAS106-052510-185-186	1.0 U
	GW-VAS106-052510-185-186-D	1.0 U
	GW-VAS106-052510-195-196	9.0 U
	GW-VAS106-052510-205-206	17.9 U
	GW-VAS121-060110-15-16	42.4 U
	GW-VAS121-060210-55-56	33.0 U
	GW-VAS121-060210-65-66	41.9 U
	GW-VAS121-060210-75-76	42.0 U
	GW-VAS121-060210-95-96-E	1.0 U
	GW-VAS121-060310-115-116	17.3 U
	GW-VAS121-060310-125-126	1.0 U
	GW-VAS121-060310-125-126-D	1.0 U
	GW-VAS121-060310-135-136	8.3 U
	GW-VAS121-060310-145-146	4.3 U
	GW-VAS121-060810-185-186	1.2 U
	GW-VAS121-060910-205-206	10 U

[1] The sample results are qualified as:
U - The material was analyzed for, but was not detected above the level of the associated value.

TABLE 6

SUMMARY OF SAMPLE DATA QUALIFIED FOR TRIP BLANK CONTAMINATION PHASE II VERTICAL AQUIFER SAMPLING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
1,2,4-Trichlorobenzene	GW-VAS115-051810-25-26	1.0 U
	GW-VAS115-051810-35-36	1.0 U
	GW-VAS115-051810-45-46	1.0 U
Acetone	GW-VAS115-051810-15-16	10 U
	GW-VAS115-051810-25-26	10 U
	GW-VAS115-051810-45-46	10 U
	GW-VAS115-051810-55-56	10 U
	GW-VAS115-051910-105-106	10 U
	GW-VAS115-051910-115-116	10 U
	GW-VAS115-051910-125-126	10 U
	GW-VAS115-051910-135-136	10 U
	GW-VAS115-051910-65-66	10 U
	GW-VAS115-051910-75-76	10 U
	GW-VAS115-051910-75-76-D	10 U
	GW-VAS115-051910-95-96	10 U
	GW-VAS101-052210-195-196	10 U
	GW-VAS101-052210-215-216	10 U
	GW-VAS115-052010-145-146	10 U
	GW-VAS121-060110-25-26	10 U
	GW-VAS121-060210-55-56	10 U
	GW-VAS121-060210-65-66	10 U
	GW-VAS121-060310-145-146	10 U
	GW-VAS121-060810-185-186	10 U

[1] The sample results are qualified as:
U - The material was analyzed for, but was not detected above the level of the associated value.

TABLE 7

SUMMARY OF DETECTED ANALYTES
FIELD DUPLICATE SAMPLES
PHASE II VERTICAL AQUIFER SAMPLING EVENT
HIMCO SITE
ELKHART, INDIANA

Analyte	*Investigative Sample GW-VAS115-051910-75-76*	*Field Duplicate Sample GW-VAS115-051910-75-76-D*	*RPD*[1]
1,1-Dichloroethane	1.2	1.2	0
Aluminum	10,400	9,350	11
Arsenic	9.1	8.8	3.4
Chloride	29.5	29.5	0
Chromium	121	105	14
Copper	55.0	52.6	4.5
Iron	25,400	23,900	6.1
Lead	18.0	16.2	11
Manganese	538	508	5.7
Nickel	54.5	47.8	13
Potassium	7,800	7,420	5.0
Sodium	18,100	18,400	1.6
Sulfate	90.6	90.2	0.4

Analyte	*Investigative Sample GW-VAS121-060310-125-126*	*Field Duplicate Sample GW-VAS121-060310-125-126-D*	*RPD*
Aluminum	5,540	5,630	1.6
Arsenic	24.5	25.9	5.6
Barium	279	303	8.2
Bromide	5.9	5.9	0
Calcium	79,900	87,300	8.9
Chloride	34.1	34.4	0.9
Chromium	96.1	84.7	13
Copper	38.3	40.0	4.3
Iron	13,300	14,400	7.9
Magnesium	36,300	39,800	9.2
Manganese	214	232	8.1
Sodium	185,000	201,000	8.3
Zinc	55.1	55.2	0.2

TABLE 7

SUMMARY OF DETECTED ANALYTES
FIELD DUPLICATE SAMPLES
PHASE II VERTICAL AQUIFER SAMPLING EVENT
HIMCO SITE
ELKHART, INDIANA

Analyte	*Investigative Sample GW-VAS106-052510-185-186*	*Field Duplicate Sample GW-VAS106-052510-185-186-D*	*RPD*
Aluminum	2,060	2,060	0
Arsenic	11.5	11.1	3.5
Calcium	50,200	48,700	3.0
Chloride	3.3	3.6	8.7
Chromium	32.1	35.0	8.6
Iron	3,100	3,070	1.0
Magnesium	21,600.0	20,900	3.3
Manganese	62.0	61.3	1.1
Sodium	13,700	13,500	1.5

[1] RPD - Relative Percent Difference

CONESTOGA-ROVERS & ASSOCIATES

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MEMORANDUM

TO:	Denise Quigley	REF. NO.:	039611
FROM:	Steve Day/br/15	DATE:	October 15, 2010
C.C.:	Alan Deal, Heidi Steinberg		

RE: Data Quality Assessment and Validation
June 2010 Groundwater Monitoring Event
Himco Site
Elkhart, Indiana

The following summarizes the data quality assessment and validation conducted for the samples collected during the June 2010 groundwater monitoring event at the Himco Site in Elkhart, Indiana. The samples identified in Table 1 were analyzed for U.S. EPA's Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), U.S. EPA's Target Analyte List (TAL) metals, total cyanide, and anions (bromide, chloride, and sulfate) by TestAmerica Laboratories, Inc. of North Canton, Ohio. The methods of analysis are presented in Table 2. The data quality evaluation criteria were established by the site-specific quality assurance project plan (QAPP).[1]

Sample Custody, Sample Receipt, and Holding Time Period Compliance

All samples were maintained properly preserved in the field staff's custody prior to being shipped to the laboratory in accordance with the requirements of the QAPP. The samples were received by the laboratory intact, properly preserved, with appropriate chain-of-custody documentation, and within the proper temperature range. All reportable data were from samples that were prepared and analyzed within the holding time periods specified in the QAPP.

Method Blank Sample Data

Method blank sample data were evaluated to verify that analytes detected in the investigative samples were not attributable to laboratory conditions or procedures. Methylene chloride, barium, and zinc were detected at estimated concentrations (i.e., less than their respective reporting limits) in method blank samples associated with certain investigative samples. Investigative sample results that were qualified as non-detected for method blank contamination are presented in Table 3. The remaining method blank samples did not contain target analytes or the concentrations of target analytes in the investigative samples were greater than five times (ten times for common laboratory contaminants) their concentrations in the

[1] Application of data quality evaluation criteria was consistent with the relevant criteria in "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA 540/R-99/008, October 1999 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540-R-04-004, October 2004.

associated method blank samples. Qualification of the investigative sample data is not required in this instance.

Surrogate Compounds Data

Method performance on individual samples analyzed for VOCs and SVOCs was evaluated by the percent recovery data of surrogate compounds added to each sample prior to analysis. The VOC and SVOC surrogate compounds percent recovery acceptance criteria were achieved for all samples.

Internal Standards Data

The laboratory noted in its case narrative that one SVOC internal standard failed to achieve the area response acceptance criteria (-50% to +100% of the daily calibration standard) during the analysis of sample GW-WT101B-061510. The internal standards data for this sample were reviewed, and the area of the affected internal standard was -50.68% of the area of the corresponding internal standard in the daily calibration standard. The SVOC results associated with the internal standard were qualified as estimated and are presented in Table 4.

Laboratory Control Sample Analyses

Analytical accuracy was evaluated by percent recovery data from laboratory control sample (LCS) analyses. Duplicate laboratory control sample (LCS/LCSD) percent recovery and relative percent difference (RPD) data were evaluated to assess the accuracy and precision of laboratory sample batches without project-specific matrix spike/matrix spike duplicate (MS/MSD) samples. The acenaphthene and 1,2,4-trichlorobenzene LCS percent recoveries associated with one SVOC extraction batch failed to meet the acceptance criteria. The samples were re-extracted and analyzed with acceptable LCS percent recoveries, but the sample extraction holding time period had expired.

The LCS data for all target SVOCs were reviewed and acenaphthene was found to be the only target SVOC that failed to meet the percent recovery acceptance criteria. Since 1,2,4-trichlorobenzene is reported from the VOC analysis (i.e., is not a target SVOC), the original SVOC results reported for the samples were determined to be usable for the purposes of the monitoring event. Table 5 summarizes the acenaphthene results qualified for LCS acceptance criteria violation. The remaining LCS percent recovery and RPD data were acceptable.

Matrix Spike/Matrix Spike Duplicate Sample Analyses

Accuracy and precision relative to the sample matrix were evaluated by the percent recovery and RPD data from MS/MSD sample analyses. Investigative sample data qualified for MS/MSD acceptance criteria violation are presented in Table 6. The remaining MS/MSD percent recovery and RPD data were acceptable or unacceptable MS/MSD data were from the analysis of MS/MSD samples that were not associated with the investigative samples.

Serial Dilution Sample Data

The laboratory noted in its case narrative that the potassium percent difference for the serial dilution analysis conducted on sample GW-WTE1-061810 failed to achieve the acceptance criteria of 10 percent. The potassium serial dilution data were reviewed, and the percent difference was found to be 17.3%.

Consequently, the potassium results reported for the associated investigative samples, GW-WTE1-061810 and GW-WTE3-061810, were qualified as estimated (J).

Sample Quantitation

VOC and SVOC results reported at concentrations less than their respective sample-specific reporting limits but greater than or equal to their respective method detection limits were flagged by the laboratory with the "J" qualifier. Metals, total cyanide, and anions results reported at concentrations less than their respective sample-specific reporting limits but greater than or equal to their respective method detection limits were flagged by the laboratory with the "B" qualifier. Results flagged as such are estimated concentrations, and the data validation "J" qualifier was applied to these results during the data validation process.

Field Quality Control Sample Analyses

The field quality control samples collected during the sampling event consisted of field equipment rinsate blank, trip blank, and field duplicate samples.

The effectiveness of the field decontamination procedure was evaluated by the data from the analysis of field equipment rinsate blank samples. Acetone, 2-butanone, copper, and total cyanide were detected, generally at estimated concentrations, in one field equipment rinsate blank sample. The associated investigative sample results qualified as non-detected for field equipment rinsate blank contamination are presented in Table 7.

Sample cross-contamination by VOCs during sample transportation and storage was evaluated by the data from trip blank samples that were submitted to the laboratory for analysis with the investigative groundwater samples. Acetone was detected in four trip blank samples, but only one investigative sample (GW-WT101B-061510) contained a similar concentration of acetone. The acetone result reported for this sample was qualified as non-detected (U) at its reporting limit (10 µg/L).

Field duplicate samples were collected to assess the overall precision of the sampling and analysis event. The QAPP requires evaluation of duplicate sample data when the concentrations of analytes detected in both the investigative and field duplicate samples are greater than five times their respective reporting limits. The RPDs calculated from these data are required to be within 50%. Although the bromide results reported sample GW-WT101C-061510 and its field duplicate did not meet the QAPP-specified evaluation criteria, the data were very dissimilar. Consequently, the bromide results reported for samples GW-WT101C-061510 and GW-WT101C-061510-D were qualified as estimated (J). Table 8 summarizes the results of, and RPDs calculated for, the investigative and field duplicate samples that met the QAPP-specified evaluation criteria. As shown in Table 8, all RPD data were acceptable, indicating overall precision for the sampling and analysis event also was acceptable.

Completeness

Completeness, as determined by the total number of usable results versus the total number of results, was required to be 90% or greater. All data were usable, and the completeness goal was attained.

Overall Assessment

The sample data are suitable for their intended use with the qualifications noted herein.

TABLE 1

SAMPLE IDENTIFICATION NUMBERS
JUNE 2010 GROUNDWATER MONITORING EVENT
HIMCO SITE
ELKHART, INDIANA

GW-WT101A-061510
TRIP BLANK-061510-1
GW-WT101D-061510
GW-WT101E-061510
GW-WT101B-061510
GW-WT101C-061510
GW-WT101C-061510-D
GW-WT02-061610
GW-WT02-061610-E
GW-WT03-061610
GW-WT04-061610
GW-WT117B-061610
GW-WT117A-061610
GW-WT117C-061710
TRIP BLANK-061710-2
GW-WT117D-061710
GW-WT104A-061710
GW-WT106B-061710
GW-WT106A-061710
GW-WT115A-061710
GW-WTE1-061810
TRIP BLANK-061810-3
GW-WTE3-061810
GW-WT120A-062110
TRIP BLANK-062110-4
GW-WT120B-062110
GW-WT111A-062210
GW-WT118B-062210
GW-WT118B-062210-E
GW-WT105A-062210
GW-WT119B-062210
GW-WT119B-062210-D
GW-WT119B-062210-D
GW-WT114A-062210
GW-WT114B-062210
GW-WT114C-062210
GW-WT116A-062310
TRIP BLANK-062310-5
GW-WT116B-062310
GW-WTB1-062310
GW-WTB3-062310
GW-WTB4-062310
GW-WT103A-062410

TABLE 2

SUMMARY OF ANALYTICAL METHODS
JUNE 2010 GROUNDWATER MONITORING EVENT
HIMCO SITE
ELKHART, INDIANA

Parameter Group/Analyte	*Preparation Method*[1]	*Analysis Method*[1]
Volatile Organic Compounds	SW-846 5030B	SW-846 8260B
Semivolatile Organic Compounds	SW-846 3520C	SW-846 8270C
Metals		
Aluminum	SW-846 3005A	SW-846 6020
Antimony	SW-846 3005A	SW-846 6020
Arsenic	SW-846 3005A	SW-846 6020
Barium	SW-846 3005A	SW-846 6010B
Beryllium	SW-846 3005A	SW-846 6010B
Cadmium	SW-846 3005A	SW-846 6010B
Calcium	SW-846 3005A	SW-846 6010B
Chromium	SW-846 3005A	SW-846 6010B
Cobalt	SW-846 3005A	SW-846 6010B
Copper	SW-846 3005A	SW-846 6010B
Iron	SW-846 3005A	SW-846 6010B
Lead	SW-846 3005A	SW-846 6010B
Magnesium	SW-846 3005A	SW-846 6010B
Manganese	SW-846 3005A	SW-846 6010B
Mercury	SW-846 7040A	SW-846 7040A
Nickel	SW-846 3005A	SW-846 6010B
Potassium	SW-846 3005A	SW-846 6010B
Selenium	SW-846 3005A	SW-846 6010B
Silver	SW-846 3005A	SW-846 6010B
Sodium	SW-846 3005A	SW-846 6010B
Thallium	SW-846 3005A	SW-846 6020
Vanadium	SW-846 3005A	SW-846 6010B
Zinc	SW-846 3005A	SW-846 6010B
Total Cyanide	SW-846 9012A	SW-846 9012A
Anions		
Bromide	EPA 300.0A	EPA 300.0A
Chloride	EPA 300.0A	EPA 300.0A
Sulfate	EPA 300.0A	EPA 300.0A

[1] Method references:
SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IIIB.
EPA - "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

TABLE 3

SUMMARY OF SAMPLE DATA QUALIFIED FOR METHOD BLANK CONTAMINATION JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
1,2,4-Trichlorobenzene	GW-WT114B-062210	1.0 U
bis(2-Ethylhexyl)phthalate	GW-WT02-061610	2.0 U
	GW-WT101A-061510	2.0 U
	GW-WT101B-061510	2.0 U
	GW-WT101C-061510-D	2.0 U
	GW-WT101E-061510	2.0 U
	GW-WT117A-061610	2.0 U
	GW-WT117B-061610	2.0 U
	GW-WTE1-061810	4.6 U
	GW-WTE3-061810	3.0 U
	GW-WT114B-062210	2.0 U
	GW-WT118B-062210	2.0 U
	GW-WT119B-062210	2.0 U
	GW-WT120A-062110	2.0 U
	GW-WT104A-061710	2.0 U
	GW-WT106A-061710	2.0 U
	GW-WT115A-061710	2.0 U
	GW-WT117C-061710	2.0 U
	GW-WT117D-061710	2.0 U
Di-n-butylphthalate	GW-WTE1-061810	2.0 U
	GW-WTE3-061810	1.8 U
	GW-WT106A-061710	1.0 U
	GW-WT115A-061710	1.0 U
Barium	GW-WT104A-061710	200 U
Manganese	GW-WT104A-061710	15.0 U
Potassium	GW-WT117A-061610	5000 U
Zinc	GW-WT02-061610	20.0 U
	GW-WT03-061610	20.0 U

TABLE 3

SUMMARY OF SAMPLE DATA QUALIFIED FOR METHOD BLANK CONTAMINATION JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Zinc	GW-WT04-061610	20.0 U
	GW-WT101A-061510	20.0 U
	GW-WT101C-061510	20.0 U
	GW-WT101C-061510-D	20.0 U
	GW-WT101D-061510	20.0 U
	GW-WT101E-061510	20.0 U
	GW-WT117A-061610	20.0 U
	GW-WT106B-061710	20.0 U
	GW-WT117D-061710	20.0 U
	GW-WT103A-062410	20.0 U
	GW-WT116A-062310	20.0 U
	GW-WTB1-062310	37.1 U
	GW-WTB3-062310	20.0 U

[1] The sample results are qualified as:
U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 4

SUMMARY OF SAMPLE DATA QUALIFIED FOR VIOLATION OF INTERNAL STANDARDS ACCEPTANCE CRITERIA JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Sample ID	*Analyte*	*Qualified Result*[1]
GW-WT101B-061510	2-Methylnaphthalene	0.20 UJ
	2-Nitrophenol	2.0 UJ
	2,4-Dichlorophenol	2.0 UJ
	2,4-Dimethylphenol	2.0 UJ
	4-Chloro-3-methylphenol	2.0 UJ
	4-Chloroaniline	2.0 UJ
	Acetophenone	2.0 J
	bis(2-Chloroethoxy)methane	1.0 UJ
	Hexachlorobutadiene	1.0 UJ
	Isophorone	1.0 UJ
	Naphthalene	0.20 UJ
	Nitrobenzene	1.0 UJ

[1] The sample results are qualified as:
J - The associated value is an estimated quantity.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 5

SUMMARY OF SAMPLE DATA QUALIFIED FOR VIOLATION OF LABORATORY CONTROL SAMPLE ACCEPTANCE CRITERIA JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Acenaphthene	GW-WT103A-062410	0.20 UJ
	GW-WT116A-062310	0.20 UJ
	GW-WT116B-062310	0.20 UJ
	GW-WTB1-062310	0.20 UJ
	GW-WTB3-062310	0.20 UJ
	GW-WTB4-062310	0.20 UJ

[1] The sample results are qualified as:
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

TABLE 6

SUMMARY OF SAMPLE DATA QUALIFIED FOR VIOLATION OF MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCEPTANCE CRITERIA JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
Bromide	GW-WT114A-062210	0.17 J
Sulfate	GW-WT114A-062210	59.6 J

[1] The sample results are qualified as:
J - The associated value is an estimated quantity.

TABLE 7

SUMMARY OF SAMPLE DATA QUALIFIED FOR VIOLATION OF FIELD EQUIPMENT RINSATE BLANK CONTAMINATION JUNE 2010 GROUNDWATER MONITORING EVENT HIMCO SITE ELKHART, INDIANA

Analyte	*Associated Samples*	*Qualified Result* [1]
2-Butanone	GW-WT105A-062210	10.0 U
	GW-WT111A-062210	10.0 U
	GW-WT114A-062210	10.0 U
	GW-WT114B-062210	10.0 U
	GW-WT114C-062210	10.0 U
	GW-WT119B-062210	10.0 U
	GW-WT119B-062210-D	10.0 U
Acetone	GW-WT105A-062210	27 U
	GW-WT111A-062210	41 U
	GW-WT114A-062210	44 U
	GW-WT114B-062210	58 U
	GW-WT114C-062210	48 U
	GW-WT118B-062210	13 U
	GW-WT119B-062210	40 U
	GW-WT119B-062210-D	26 U
Copper	GW-WT114A-062210	25.0 U
	GW-WT114C-062210	25.0 U
Cyanide (total)	GW-WT119B-062210	0.010 U

[1] The sample results are qualified as:
U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

TABLE 8

SUMMARY OF DETECTED ANALYTES
FIELD DUPLICATE SAMPLES
JUNE 2010 GROUNDWATER MONITORING EVENT
HIMCO SITE
ELKHART, INDIANA

Analyte	*Investigative Sample GW-WT101C-061510*	*Field Duplicate Sample GW-WT101C-061510-D*	*RPD*[1]
Aluminum	92.2	78.5	16
Arsenic	8.2	7.9	3.7
Calcium	50,100	48,700	2.8
Chloride	2.8	2.7	3.6
Iron	1,100	1,070	2.8
Magnesium	19,900	19,500	2.0
Sodium	20,100	20,000	0.5
Sulfate	1.1	1.2	8.7

Analyte	*Investigative Sample GW-WT119B-062210*	*Field Duplicate Sample GW-WT119B-062210-D*	*RPD*
Aluminum	292	256	13
Arsenic	4.9	4.6	6.3
Calcium	192000	194000	1.0
Chloride	28.4	27.4	3.6
Iron	2,500	2,470	1.2
Magnesium	69,600	70,000	0.6
Manganese	245	248	1.2
Potassium	12700	12800	0.8
Sodium	65400	70600	7.6
Sulfate	425	431	1.4

[1] RPD - Relative Percent Difference

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APPENDIX D

GROUNDWATER SAMPLING STABILIZATION PARAMETERS

TABLE D.1

FIELD PARAMETER SUMMARY
GROUNDWATER SAMPLING RESULTS JUNE 2010
HIMCO SITE
ELKHART, INDIANA

Location:		*WT101A*	*WT101B*	*WT101C*	*WT101D*	*WT101E*	*WT103A*	*WT104A*	*WT105A*	*WT106A*	*WT106B*	*WT111A*
Date:		*6/15/2010*	*6/15/2010*	*6/15/2010*	*6/15/2010*	*6/14/2010*	*6/24/2010*	*6/17/2010*	*6/22/2010*	*6/17/2010*	*6/17/2010*	*6/22/2010*
	Units											
Field Parameters												
Color	none	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Conductivity, field	mS/cm	1.800	0.747	0.344	0.532	0.610	1.010	0.169	0.380	0.632	1.002	1.180
Dissolved oxygen (DO), field	mg/L	0.64	0.31	0.56	0.33	0.79	0.21	0.85	0.34	0.64	0.60	0.29
Oxidation reduction potential (ORP), field	millivolts	-117	-322.9	-231.8	-105.9	-116.1	-170	-17.8	-51	-71.4	-123.7	-73
pH, field	s.u.	7.36	7.12	7.49	7.09	7.04	7.80	7.34	7.96	6.94	6.87	7.24
Temperature, field	Deg C	12.90	13.96	13.04	13.50	15.43	9.53	13.51	13.56	12.20	12.50	12.33
Turbidity (field)	NTU	1.45	9.62	5.39	0.98	2.66	8.83	1.34	4.01	3.13	0.93	4.68

Notes:

mS/cm - milliSiemens per cm
mg/L - milligrams per litre
s.u. - Standard units
NTU - Nephelometric Turbidity Units

TABLE D.1

FIELD PARAMETER SUMMARY
GROUNDWATER SAMPLING RESULTS JUNE 2010
HIMCO SITE
ELKHART, INDIANA

Location:		*WT114A*	*WT114B*	*WT114C*	*WT115A*	*WT116A*	*WT116B*	*WT117A*	*WT117B*	*WT117C*	*WT117D*	*WT118B*
Date:		*6/14/2010*	*6/23/2010*	*6/22/2010*	*6/17/2010*	*6/23/2010*	*6/23/2010*	*6/16/2010*	*6/16/2010*	*6/17/2010*	*6/17/2010*	*6/22/2010*
	Units											
Field Parameters												
Color	none	clear	clear	clear	cloudy	clear	clear	clear	clear	clear	clear	clear
Conductivity, field	mS/cm	1.850	0.674	0.637	0.293	3.990	1.090	0.068	1.052	1.081	0.660	1.040
Dissolved oxygen (DO), field	mg/L	0.33	0.50	0.65	0.49	0.35	0.34	0.95	0.32	0.85	0.52	0.30
Oxidation reduction potential (ORP), field	millivolts	-97	-217	-142	-134.2	-110	-194	-16.1	-228.9	-69.5	-148.1	-220
pH, field	s.u.	7.52	8.27	8.04	6.49	7.46	7.67	6.70	6.83	6.51	6.98	7.76
Temperature, field	Deg C	14.24	14.07	14.43	13.94	15.14	13.70	11.87	13.90	11.32	11.93	12.90
Turbidity (field)	NTU	3.48	1.20	4.72	171	4.13	1.41	17.1	0.56	1.73	1.23	1.04

Notes:

mS/cm - milliSiemens per cm
mg/L - milligrams per litre
s.u. - Standard units
NTU - Nephelometric Turbidity Units

TABLE D.1

FIELD PARAMETER SUMMARY
GROUNDWATER SAMPLING RESULTS JUNE 2010
HIMCO SITE
ELKHART, INDIANA

Location:		*WT119B*	*WT120A*	*WT120B*	*WTB1*	*WTB3*	*WTB4*	*WTE1*	*WTE3*	*WTO2*	*WTO3*	*WTO4*
Date:		*6/22/2010*	*6/21/2010*	*6/21/2010*	*6/23/2010*	*6/23/2010*	*6/23/2010*	*6/18/2010*	*6/18/2010*	*6/16/2010*	*6/16/2010*	*6/16/2010*
	Units											
Field Parameters												
Color	none	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Conductivity, field	mS/cm	1.650	0.741	0.608	0.689	0.650	0.474	0.551	0.722	0.521	0.327	0.351
Dissolved oxygen (DO), field	mg/L	0.79	0.30	0.35	0.31	0.37	0.25	0.32	0.41	0.84	1.01	0.83
Oxidation reduction potential (ORP), field	millivolts	-51	-126	-148	-134	-124	-313	-236.6	-297.2	-135.3	-81.6	-131.5
pH, field	s.u.	7.32	8.25	8.31	8.31	8.31	7.86	7.25	7.10	7.18	7.46	7.54
Temperature, field	Deg C	13.51	14.50	14.12	12.61	14.11	16.24	13.16	14.27	15.61	14.56	14.51
Turbidity (field)	NTU	4.69	2.93	4.59	1.14	2.16	1.84	0.91	0.95	2.02	4.34	17.5

Notes:

mS/cm - milliSiemens per cm
mg/L - milligrams per litre
s.u. - Standard units
NTU - Nephelometric Turbidity Units

APPENDIX E

STRATIGRAPHIC LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	NORTHING: 2351870.41 EASTING: 235712.42 GROUND SURFACE	761.13						
0	TOPSOIL, roots, rock, black.	760.83						
	SP-SAND, medium grained, loose, tan, slight orange (iron) staining, slightly moist.							
2								
4								
6								
8	- saturated at 8.0ft BGS							
10	- black, *decomposition/rotting odor* at 9.6ft BGS	751.13	BENTONITE GROUT					
	SW-SAND, coarse grained, well graded, with coarse gravel and medium sand, loose, gray, saturated.							
12								
14								
	- medium to coarse grained at 15.0ft BGS		6" Ø BOREHOLE					
16								
18								
20	- coarse grained, with coarse gravel at 20.0ft BGS							
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

1-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

OVERBURDEN LOG

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
36	GW-GRAVEL, coarse grained, with coarse sand, loose, gray, saturated.	726.13						
38								
		722.13						
40	SW-SAND, coarse to medium grained, with gravel, loose, gray, saturated. - coarse grained, with fine gravel at 40.0ft BGS							
42								
44								
		716.13						
46	SW-SAND, coarse to medium grained, loose, gray, saturated.							
48								
50								
52								
54								
56								
58								
60		701.13						
	SW-SAND, coarse and medium grained, trace gravel, trace fine sand, loose, gray, saturated.							
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (O)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
72	- fine to medium grained at 70.0ft BGS							
74								
		686.13						
76	CL-CLAY, gravelly, low plasticity, firm, brown, wet.							
		684.13						
78	SP-SAND, fine grained, poorly graded, trace silt, brown, saturated.							
80		681.13						
	SM-SILTY SAND, fine grained, poorly graded, brown, saturated.							
82								
84								
86								
88								
90								
92								
94								
		666.13						
	SC-CLAYEY SANDS, fine grained, poorly graded, brown, saturated.							
96		665.13						
	SM-SILTY SAND, fine grained, poorly graded, brown, saturated.							
98								
100		661.13						
	SP-SAND, trace silt, fine grained, poorly sorted, brown, saturated.							
102								
104								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
106								
108								
110								
112								
114								
116								
118								
120								
122								
124								
126								
128								
130								
132								
134								
136	SM-SILTY SAND, fine grained, poorly sorted, brown, saturated.	626.13						
138								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
142								
144								
146								
148								
		612.13						
150	ML-CLAYEY SILT, medium density, gray.	611.13						
152	CL-SILTY CLAY, with sand, low plasticity, gray, soft, moist.			1S		50		0.0
154		607.63						
156	SP-SAND, with silt, trace clay, loose, fine grained, brown to gray, saturated.							
158	- change to gravel and silt at 157.0ft BGS	603.13						0.0
160	ML-SILT and CLAY, trace sand, soft, slight plasticity, brown, wet.			2S		80		
162		598.73						0.0
164	SP-SAND, loose, fine grained to trace medium grained, brown, saturated.							
166								
168								0.0
		592.13						
170	CL-CLAY, with silt, trace cobbles, firm, low plasticity, brown, slightly moist.			3S		100		
172								0.0
174								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSTRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
176								
178								0.0
180				4S		70		
182								0.0
184								
186	SP-SAND, loose, fine grained to trace medium grained, brown, saturated.	576.13						0.0
188								
190				5S		100		
192	- with silt from 191.0 to 192.5ft BGS							0.0
194								
196								
198	ML-SILT, with clay, soft, slight plasticity, gray, wet.	564.13						0.0
200				6S		100		
202								0.0
204								
206								
208								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS101-225
DATE COMPLETED: May 22, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
212	CL-CLAY, with cobbles, hard, low plasticity, gray, slightly green, dry.	551.13		7S		70		0.0
214	GP-GRAVEL, with clay, loose, coarse grained, poorly graded, brown, saturated.	548.13						
216								
218				8S		80		0.0
220	SHALE- hard, friable, blue, dry.	541.13						
222								0.0
224	END OF BOREHOLE @ 223.0ft BGS	538.13						
226								
228								
230								
232								
234								
236								
238								
240								
242								
244								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611.WIN TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	758.31						
0	TOPSOIL, roots, dark brown.							
	SP-SAND, fine grained, trace medium grained, loose, orange stain, slightly moist.	757.31						
2								
4								
6	- saturated at 6.0ft BGS							
8								
10			BENTONITE GROUT					
	- 1.5' coarse grained at 11.0ft BGS							
12								
14								
	SW-SAND, medium to coarse grained, trace gravel, loose, light gray, saturated.	743.31	6" Ø BOREHOLE					
16								
18								
20								
22		736.31						
	SW-SAND, fine to medium grained, trace coarse grained, loose, gray, saturated.							
24								
	- 1.5' coarse grained, with gravel at 25.5ft BGS							
26								
28								
30		728.31						
	SW-SAND, coarse grained sand and gravel, loose, gray, saturated.							
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010 GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
36								
38								
40		718.81						
	ML-SILT, with sand, firm, slight plasticity, gray, moist.							
42	- moist, with clay at 41.0ft BGS							
44								
46								
48		710.31						
	ML-SILTY CLAY, trace sand, firm, gray, moist, intermixed sand seams.							
50		708.31						
	SM-SILTY SAND, fine grained, loose, tan, saturated.							
52								
54								
56								
58		700.31						
	ML-SANDY SILT, loose, tan, moist, moist.							
60		698.31						
	SM-SILTY SAND, fine grained, loose, tan, saturated.							
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○)

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
72								
74								
76								
78								
80								
82								
84								
86								
88								
90								
92								
94								
96								
98	- 2.5' with coarse gravel and clay at 97.5ft BGS							
100	- 3' with medium sand at 100.0ft BGS							
102								
104								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
106								
108								
110								
112								
114								
116								
118	CL-SILTY CLAY, tan.	640.31						
		639.31						
120	SM-SILTY SAND, fine grained, loose, tan, saturated.							
122								
124								
126								
128								
130								
132								
134								
136								
138								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (◯)

OVERBURDEN LOG 039611.WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
142								
144								
146	ML/CL-CLAYEY SILT, soft, with sand, gray, saturated.	612 31						
148								
150	ML/SP - SILT and SAND, soft/loose, fine grained sand, no plasticity, brown, saturated.	608.31						
152				1S		100		0.0
154								
156								
158	CL/ML - SILT and CLAY, firm, slight to low plasticity, gray, moist.	601.31						0.0
160				2S		100		
162								0.0
164	ML-SILT, with clay, firm, slight plasticity, gray, moist/wet.	595.31						
166								
168								0.0
170	- slightly moist at 171.0ft BGS			3S		100		
172								0.0
174								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
176								
178								0.0
180				4S		100		
182								0.0
184								
186								
188								0.0
190				5S		100		
192	SP - SAND, compact, fine grained, poorly sorted, brown, saturated.	567.31						0.0
194	- dense at 193.0ft BGS							
196								0.0
198								
200				6S		100		
202	- silt from 201.0 to 202.5ft BGS							0.0
204								
206								
208								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS106-225
DATE COMPLETED: May 24, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
212	ML - SANDY SILT, firm, slight to no plasticity, gray, wet.	548.31		7S		100		
	- with clay, low plasticity, slightly moist, no sand at 212.0ft BGS							0.0
214								
216								
218	- dry at 218.0ft BGS							0.0
220				8S		100		
222	SHALE - hard, friable, blue, dry.	536.31						0.0
224								
	END OF BOREHOLE @ 225.0ft BGS	533.31						
226								
228								
230								
232								
234								
236								
238								
240								
242								
244								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	762.70						
0	SP - SAND, trace topsoil, very loose, fine grained, black, moist, grass and tree roots, slight iron staining.	761.70						
2	SP - SAND, fine to medium grained, very loose, tan, moist, slight iron staining.			1S		100		0.0
4								
6								
8				2S		100		0.0
	- saturated at 9.0ft BGS							
10			BENTONITE GROUT					
	- coarse grained, light brown to gray at 11.0ft BGS							
12				3S		100		0.0
	- fine grained at 13.0ft BGS							
14								
	- medium to coarse grained, gray, odor, sulfur smell/rotten material at 15.0ft BGS		6" Ø BOREHOLE					
16								
18								0.0
20				4S		75		
22								10.0
24								
26								
	- with gravel, gray from 27.0 to 29.0ft BGS							3.1
28								
	- coarse grained, trace gravel at 29.0ft BGS							
30				5S		80		
32								2.9
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611.WIN TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
36								
38								1.9
40				6S		70		
42								2.1
44	- gravel, brown from 43.0 to 46.0ft BGS							
46	- medium to coarse grained, brown at 46.0ft BGS							0.0
48								
50				7S		70		
52								0.0
54								
56								
58								0.0
60				8S		90		
62								0.0
64								
66	- coarse grained at 65.0ft BGS							
68								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
72	- fine grained, trace cobbles at 73.0ft BGS			9S		80		0.0
74								
76								0.0
78								
80	medium grained			10S		90		
82		679.70						0.0
84								
86								0.0
88								
90				11S		80		
92								0.0
94								
96								8.1
98								
100				12S		90		
102								21.5
104								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
106								
108								7.6
110				13S		100		
112								8.1
114								
116								
118								1.9
120				14S		80		
122								2.1
124								
126								
128								0.0
130				15S		95		
132								0 0
134								
136								
138								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
142				16S		100		0.0
144								
146								
148	- with silt from 148.0 to 153.0ft BGS							0.0
150				17S		100		
152								0.0
154								
156								
158								
160				18S		100		
162								
164								
166	CL - SILTY CLAY, firm, medium plasticity, gray, moist.	596.70						
168								
170				19S		80		
172	GP - GRAVEL, loose, coarse grained, trace fine grained, brown, saturated.	591.70						
174								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS115-175
DATE COMPLETED: May 18, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE N' VALUE	SAMPLE PID (ppm)
176	END OF BOREHOLE @ 176.0ft BGS	586.70						
178								
180								
182								
184								
186								
188								
190								
192								
194								
196								
198								
200								
202								
204								
206								
208								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	758.58						
0	GP/SP - GRAVEL AND SAND	758.28						
2	SP - SAND, trace cobble, loose, coarse grained to trace fine grained sand, brown, moist.							0.0
4				1S		100		
6								
8	- saturated from 8.5 to 9.0ft BGS							0.0
10			BENTONITE GROUT					
12	- no cobbles at 12.0ft BGS			2S		100		0.0
14								
16			6" Ø BOREHOLE					
18								0.0
20				3S		70		
22								0.0
24								
26	GP/SP - GRAVEL and SAND, trace cobbles, loose, coarse grained sand, gray, saturated.	733.58						0.0
28								
30				4S		50		
32								0.0
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611.WIN TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
36								
	CI - CLAY, trace silt, firm, medium plasticity, gray, moist.	722.08						0.0
38								
40				5S		100		
42								0.0
44								
46								
48								0.0
50				6S		100		
52								0.0
54								
	SP - SAND, loose to compact, fine grained, poorly graded, brown, saturated.	703.58						
56								
58								0.0
60				7S		70		
62	- medium grained at 62.0ft BGS							0.0
64								
66	- fine grained at 66.0ft BGS							
68								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
72	- with silt at 72.0ft BGS			8S		100		0.0
74								
76								0.0
78								
80	CI - SILTY CLAY, firm, medium plasticity, gray, moist.	678.58		9S		100		0.0
82								
84	- with fine sand, wet at 84.0ft BGS							
	SP - SAND, compact, fine grained, poorly graded, brown/tan, saturated.	674.08						
86								0.0
88								
90				10S		100		
92								0.0
94								
96								0.0
98								
100				11S		100		
102	- with silt at 101.0ft BGS							0.0
104								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 39611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
106								
108								0.0
110				12S		80		
112	- trace silt at 112.0ft BGS							0.0
114								
116								
118								0.0
120				13S		100		
122								0.0
124								
126								
128								0.0
130				14S		100		
132								0.0
134								
136								
138								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
142	- and silt at 143.0ft BGS		15S		100		0.0
144							
146	CL/ML - SILT AND CLAY, firm, low plasticity, gray, moist.	613.58					0.0
148							
150			16S		100		
152							0.0
154							
156	- clay with silt, very stiff, dry at 157.0ft BGS						0.0
158							
160			17S		100		
162							0.0
164							
166							0.0
168							
170			18S		100		
172	- sand seam from 173.0 to 173.1ft BGS						0.0
174							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
176								
178								0.0
	- with gravel from 179.0 to 181.0ft BGS							
180				19S		100		
182								0.0
	- sand seam from 183.0 to 183.5ft BGS							
184	- sand seam from 184.0 to 184.2ft BGS							
	SP - SAND, dense, fine grained, brown/tan, saturated.	573.58						
186								
188								0.0
190				20S		100		
192								0.0
194								
196								
	- fine grained sand and silt at 197.0ft BGS							0 0
198								
200				21S		100		
202								0 0
204								
206		552.58						
	ML - SANDY SILT, stiff, no plasticity, gray, moist.							
208								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: VAS121-225
DATE COMPLETED: June 1, 2010
DRILLING METHOD: SONIC
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
212				22S		100		0.0
	- silt at 213.0ft BGS							
214	- with clay, pieces of shale at 214.0ft BGS							
216								
218								0.0
220				23S		100		
	SHALE, friable, blue-green.	537.58						
222								0.0
224								
	END OF BOREHOLE @ 225.0ft BGS	533.58						
226								
228								
230								
232								
234								
236								
238								
240								
242								
244								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101D
DATE COMPLETED: May 3, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 2351877.84 EASTING: 235718.22 TOP OF CASING TOP OF RISER GROUND SURFACE	764.01 763.62 761.63					
0	TOPSOIL, roots, rock, black	761.33	BENTONITE/ CONCRETE				
2	SP-SAND, *medium grained, loose, tan, slight* orange (iron) staining, slightly moist						
4			BENTONITE GROUT				
6							
8	- saturated at 8.0ft BGS		2" Ø PVC WELL CASING				
10	- black, decomposition/rotting odor at 9.6ft BGS	751.63	8" Ø BOREHOLE				
12	SW-SAND, coarse grained, well graded, with coarse gravel and medium sand, loose, gray, saturated						
14							
16	- medium to coarse grained at 15.0ft BGS						
18							
20	- coarse grained, with coarse gravel at 20.0ft BGS						
22							
24							
26							
28							
30							
32							
34							
36	GW-GRAVEL, coarse grained, with coarse sand, loose, gray, saturated	726.63					
38							
	SW-SAND, coarse to medium grained, with	722.63					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101D
DATE COMPLETED: May 3, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
42	gravel, loose, gray, saturated - coarse grained, with fine gravel at 40.0ft BGS						
44							
46	SW-SAND, coarse to medium grained, loose, gray, saturated	716.63					
48							
50							
52							
54			3/8" HOLE PLUG				
56							
58							
60			2" Ø PVC WELL SCREEN	1	X		
62			SAND WP01 (#6)				
64	END OF BOREHOLE @ 63.0ft BGS	698.63					
66							
68							
70							
72							
74							
76							
78							

WELL DETAILS
Screened interval:
703.63 to 698.63ft
58.00 to 63.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
708.63 to 705.63ft
53.00 to 56.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
698.63 to 705.63ft
63.00 to 56.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101E
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2351861.93
EASTING: 235726.5

	ELEV. ft
TOP OF CASING	763.72
TOP OF RISER	763.40
GROUND SURFACE	761.52

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, roots, rock, black	761.22
	SP-SAND, medium grained, loose, tan, slight orange (iron) staining, slightly moist	
8	- saturated at 8.0ft BGS	
10	- black, decomposition/rotting odor at 9.6ft BGS	751.52
	SW-SAND, coarse grained, well graded, with coarse gravel and medium sand, loose, gray, saturated	
15	- medium to coarse grained at 15.0ft BGS	
20	- coarse grained, with coarse gravel at 20.0ft BGS	

MONITORING WELL: BENTONITE/CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101E
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36	GW-GRAVEL, coarse grained, with coarse sand, loose, gray, saturated	726.52					
38							
40	SW-SAND, *coarse to medium grained, with* gravel, loose, gray, saturated - coarse grained, with fine gravel at 40.0ft BGS	722.52					
42							
44							
46	SW-SAND, coarse to medium grained, loose, gray, saturated	716.52					
48							
50							
52							
54							
56							
58							
60	SW-SAND, *coarse and medium grained, trace* gravel, trace fine sand, loose, gray, saturated	701.52					
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101E
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	- fine to medium grained at 70.0ft BGS						
72							
74							
		686.52					
76	CL-CLAY, gravelly, low plasticity, firm, brown, wet						
		684.52					
78	SP-SAND, fine grained, poorly graded, trace silt, brown, saturated						
80		681.52					
	SM-SILTY SAND, fine grained, poorly graded, brown, saturated						
82							
84							
86							
88							
90							
92							
94							
		666.52					
	SC-CLAYEY SANDS, fine grained, poorly graded, brown, saturated						
96		665.52					
	SM-SILTY SAND, fine grained, poorly graded, brown, saturated						
98							
100		661.52					
	SP-SAND, trace silt, fine grained, poorly sorted, brown, saturated						
102							
104							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT101E
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
106							
108							
110							
112							
114			3/8" HOLE PLUG				
116							
118							
120			2" Ø PVC WELL SCREEN	1			
122			SAND WP01 (#6)				
124	END OF BOREHOLE @ 123.0ft BGS	638.52					
126							
128							
130							
132							
134							
136							
138							

WELL DETAILS
Screened interval:
643.52 to 638.52ft
118.00 to 123.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
648.52 to 645.52ft
113.00 to 116.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
645.52 to 638.52ft
116.00 to 123.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 39611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT106B
DATE COMPLETED: May 10, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2351175.05
EASTING: 235885.57

TOP OF CASING 761.87
TOP OF RISER 761.53
GROUND SURFACE 758.71

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	TOPSOIL, roots, dark brown		BENTONITE/ CONCRETE				
		757.71					
2	SP-SAND, fine grained, trace medium grained, loose, orange stain, slightly moist						
4			BENTONITE GROUT				
6	- saturated at 6.0ft BGS						
8			2" Ø PVC WELL CASING				
10			8" Ø BOREHOLE				
12	- 1.5' coarse grained at 11.0ft BGS						
14							
		743.71					
16	SW-SAND, medium to coarse grained, trace gravel, loose, light gray, saturated						
18							
20							
22		736.71					
	SW-SAND, fine to medium grained, trace coarse grained, loose, gray, saturated						
24							
26	- 1.5' coarse grained, with gravel at 25.5ft BGS						
28							
		728.71					
30	SW-SAND, coarse grained sand and gravel, loose, gray, saturated						
32							
34							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT106B
DATE COMPLETED: May 10, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36							
38							
40	ML-SILT, with sand, firm, slight plasticity, gray, moist - moist, with clay at 41.0ft BGS	719.21					
42							
44							
46							
48	ML-SILTY CLAY, trace sand, firm, gray, moist, intermixed sand seams	710.71					
50	SM-SILTY SAND, fine grained, loose, tan, saturated	708.71					
52							
54							
56							
58	ML-SANDY SILT, loose, tan, moist, moist	700.71					
60	SM-SILTY SAND, fine grained, loose, tan, saturated	698.71					
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT106B
DATE COMPLETED: May 10, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
72							
74							
76							
78							
80							
82							
84							
86							
88							
90							
92							
94							
96							
98	- 2.5' with coarse gravel and clay at 97.5ft BGS						
100	- 3' with medium sand at 100.0ft BGS						
102							
104							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT106B
DATE COMPLETED: May 10, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
106							
108							
110							
112			3/8" HOLE PLUG				
114			2" Ø PVC WELL SCREEN				
			SAND WP01 (#6)	1			
	END OF BOREHOLE @ 115.0ft BGS	643.71					
116							
118							
120							
122							
124							
126							
128							
130							
132							
134							
136							
138							

WELL DETAILS
Screened interval:
648.71 to 643.71ft
110.00 to 115.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
653.71 to 650.71ft
105.00 to 108.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
650.71 to 643.71ft
108.00 to 115.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT114C
DATE COMPLETED: May 11, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352110.84
EASTING: 236068.83

TOP OF CASING 769.23
TOP OF RISER 768.87
GROUND SURFACE 766.14

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, sandy	765.64
	SP-SAND, fine grained, loose, brown, slightly moist, orange stain	
14	SW-SAND, medium grained, trace coarse grained, trace gravel, loose, gray, saturated	752.14
20	SP-SAND, fine grained, loose, gray, saturated	746.14
26	SW-SAND, medium to coarse grained, trace gravel, loose, gray, saturated	740.14
34	- increase in coarse grained, with gravel at 33.5ft BGS	

MONITORING WELL: BENTONITE/CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE: NUMBER | INTERVAL | REC (%) | 'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT114C
DATE COMPLETED: May 11, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36	- medium grained, trace fines at 35.0ft BGS						
38	- coarse grained, with gravel at 37.0ft BGS						
40							
42							
44							
46							
48							
50	SW-SAND, medium to coarse grained, with gravel, trace cobbles, loose, gray, saturated	716.14					
52							
54							
56							
58							
60	SW-SAND, coarse grained, with gravel, very loose, gray, saturated	706.14					
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 39611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT114C
DATE COMPLETED: May 11, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
72							
74							
76							
78							
80	SW-SAND, fine grained, loose, brown, saturated	686.14					
82							
84							
86							
88							
90							
92							
94							
96							
98							
100							
102							
104							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT114C
DATE COMPLETED: May 11, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
106							
108							
110							
112							
114							
116							
118			3/8" HOLE PLUG				
120							
122							
124			2" Ø PVC WELL SCREEN	1			
126			SAND WP01 (#6)				
	END OF BOREHOLE @ 127.0ft BGS	639.14					
128							
130							
132							
134							
136							
138							

WELL DETAILS
Screened interval:
644.14 to 639.14ft
122.00 to 127.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
649.14 to 646.14ft
117.00 to 120.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
646.14 to 639.14ft
120.00 to 127.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT117C
DATE COMPLETED: May 6, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 2352476.42 EASTING: 234005 49 TOP OF CASING TOP OF RISER GROUND SURFACE	766.90 766.53 763.74					
0	TOPSOIL, sandy, with roots, dark brown - moist at 1.0ft BGS	762.94	BENTONITE/ CONCRETE				
2	SP-SAND, fine grained, loose, tan, slightly moist, orange stain						
4			BENTONITE GROUT				
6			2" Ø PVC WELL CASING				
8			8" Ø BOREHOLE				
10	- saturated at 9.5ft BGS						
12							
14							
16	SW-SAND, medium to coarse grained, trace gravel, loose, gray, saturated	748.74					
18							
20			3/8" HOLE PLUG				
22							
24							
26	- coarser at 25.0ft BGS		2" Ø PVC WELL SCREEN				
28	END OF BOREHOLE @ 28.0ft BGS	735.74	SAND WP01 (#6)				
30							
32							
34							
36							
38							

WELL DETAILS
Screened interval:
740.74 to 735.74ft
23.00 to 28.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
745.74 to 742.74ft
18.00 to 21.00ft BGS
Material: 3/8" Hole Plug
Sand Pack
742.74 to 735.74ft
21.00 to 28 00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT117D
DATE COMPLETED: May 6, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352476.61
EASTING: 234013.25

	ELEV. ft
TOP OF CASING	766.90
TOP OF RISER	766.58
GROUND SURFACE	763.90

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, sandy, with roots, dark brown	763.10
	- moist at 1.0ft BGS	
2	SP-SAND, fine grained, loose, tan, slightly moist, orange stain	
4		
6		
8		
10	- saturated at 9.5ft BGS	
12		
14		
	SW-SAND, medium to coarse grained, trace gravel, loose, gray, saturated	748.90
16		
18		
20		
22		
24		
26	- coarser at 25.0ft BGS	
28		
	SP-SAND, fine grained, trace medium grained, loose, light gray, saturated	733.90
30		
32		
34		

MONITORING WELL: BENTONITE/ CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE: NUMBER | INTERVAL | REC (%) | 'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-1SFRD TO M. HILVEKUA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT117D
DATE COMPLETED: May 6, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36							
38							
40							
42							
44							
46							
48							
50	SW-SAND, coarse grained, with gravel, very loose, gray, saturated	713.90					
52							
54							
56							
58							
60	- with medium grained sand at 60.0ft BGS						
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT117D
DATE COMPLETED: May 6, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
72							
74							
76							
78							
80	SP-SAND, fine grained, loose, trace silt, trace gravel, tan, saturated	683.90					
82							
84							
86							
88							
90							
92							
94							
96							
98							
100							
102							
104			3/8" HOLE PLUG				

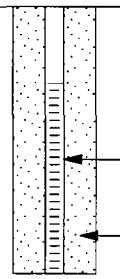
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT117D
DATE COMPLETED: May 6, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
106							
108							
110							
112	END OF BOREHOLE @ 112.0ft BGS	651.90					
114							
116							
118							
120							
122							
124							
126							
128							
130							
132							
134							
136							
138							



WELL DETAILS
Screened interval:
656 90 to 651.90ft
107 00 to 112.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
661.90 to 658.90ft
102.00 to 105.00ft BGS
Material 3/8" Hole Plug
Sand Pack:
658 90 to 651 90ft
105.00 to 112.00ft BGS
Material: Sand WP01 (#6)

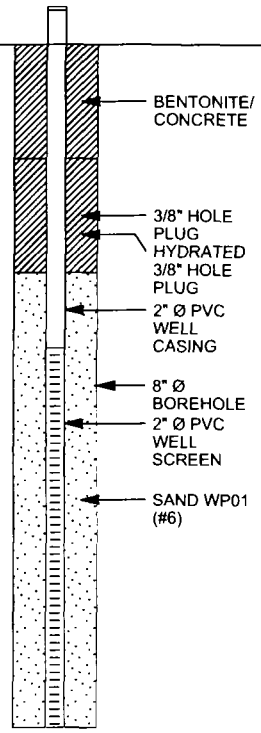
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT119B
DATE COMPLETED: May 5, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 2351888.96 EASTING: 234845.5 TOP OF CASING TOP OF RISER GROUND SURFACE	762.96 762.62 760.32					
16	SP - SAND, poorly graded, fine grained, tan, saturated.			1			
18	END OF BOREHOLE @ 18.0ft BGS	742.32					



WELL DETAILS
Screened interval:
752.32 to 742.32ft
8.00 to 18.00ft BGS
Length: 10ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
757.32 to 754.32ft
3.00 to 6.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
754.32 to 742.32ft
6.00 to 18.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120A
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352059.17
EASTING: 236578.58

TOP OF CASING 762.52
GROUND SURFACE 762.43
TOP OF RISER 762.19

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
	TOPSOIL, roots	761.63
	SP-SAND, loose, orange stain, slightly moist	
10	SW-SAND, coarse grained, with coarse gravel, loose, light gray, moist	752.93 / 752.43
	SW-SAND, fine to medium grained, brown-orange, saturated	
15	- 3' medium grained at 15.0ft BGS	
25	SW-SAND, coarse grained, with gravel, loose, gray, saturated, intermittent fine zones (approx. 6" thick) from 25-50ft BGS	737.43
	- fine grained at 43.0ft BGS	
50	SW-SAND, coarse grained, with gravel, very loose, gray, saturated	712.43

MONITORING WELL: BENTONITE/CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE: NUMBER | INTERVAL | REC (%) | 'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120A
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
55							
60	- medium grained at 60.0ft BGS						
65			3/8" HOLE PLUG				
70	- fine to medium grained sand from 71.0 to 73.0ft BGS		2" Ø PVC WELL SCREEN SAND WP01 (#6)	1			
	END OF BOREHOLE @ 73.0ft BGS	689.43					
75							
80							
85							
90							
95							
100							

WELL DETAILS
Screened interval:
694.43 to 689.43ft
68.00 to 73.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
699.43 to 696.43ft
63.00 to 66.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
696.43 to 689.43ft
66.00 to 73.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120B
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352065.6
EASTING: 236578.16

TOP OF CASING 762.59
GROUND SURFACE 762.58
TOP OF RISER 762.18

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, roots	761.78
	SP-SAND, loose, orange stain, slightly moist	
10	SW-SAND, coarse grained, with coarse gravel, loose, light gray, moist	753.08 / 752.58
	SW-SAND, fine to medium grained, brown-orange, saturated	
	- 3' medium grained at 15.0ft BGS	
25	SW-SAND, coarse grained, with gravel, loose, gray, saturated, intermittent fine zones (approx. 6" thick) from 25-50ft BGS	737.58

MONITORING WELL: BENTONITE/CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE	NUMBER	INTERVAL	REC (%)	'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120B
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36							
38							
40							
42							
	- fine grained at 43.0ft BGS						
44							
46							
48							
50							
52							
54							
56							
58							
60	- medium grained at 60.0ft BGS						
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120B
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
70	- 10' NO RECOVERY, very loose at 70.0ft BGS						
72							
74							
76							
78							
80							
82							
84							
86							
88							
90	- coarse gravel, cobbles, coarse sand at 90.0ft BGS						
92							
94							
96							
98	- clay, with cobbles at 97.0ft BGS						
100							
102							
104	CL-SILTY CLAY, low plasticity, tan to light	658.58					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WT120B
DATE COMPLETED: May 12, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
106	gray, slightly moist, thin sand layers						
108	- 3" saturated sand seam at 107.0ft BGS		3/8" HOLE PLUG				
110	SP-SAND, fine grained sand, trace silt, loose, brown, saturated	652.58					
112	END OF BOREHOLE @ 112.0ft BGS		2" Ø PVC WELL SCREEN				
114							
116		645.58	SAND WP01 (#6)	1	X		
118							
120							
122							
124							
126							
128							
130							
132							
134							
136							
138							

WELL DETAILS
Screened interval:
650.58 to 645.58ft
112.00 to 117.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
655.58 to 652.58ft
107.00 to 110.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
652.58 to 645.58ft
110.00 to 117.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

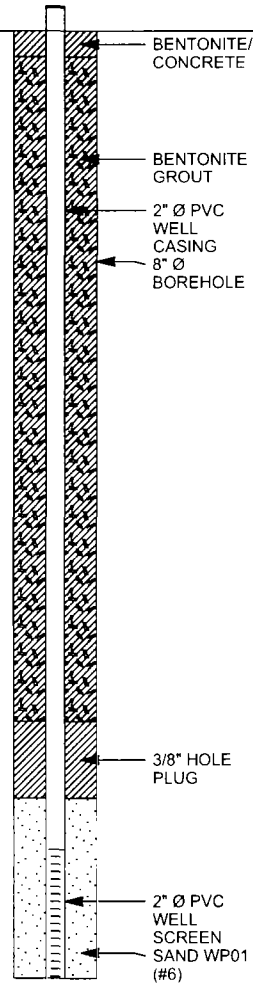
HOLE DESIGNATION: WTO2
DATE COMPLETED: May 5, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352659.27
EASTING: 235970.66

TOP OF CASING 766.31
TOP OF RISER 765.95
GROUND SURFACE 763.15

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
	TOPSOIL, with sand	762.15
	ML-SANDY SILT, slight plasticity, soft, loose, tan to light brown, slightly moist	761.15
	SM-SAND, fine grained, with silt, loose, tan to light brown, slightly moist	758.35
5	SP-SAND, medium grained, trace gravel, loose, dark orange-red (oxidation), slightly moist	
10	- coarse grained, with gravel, saturated at 10.0ft BGS	
15		
20	SW-SAND, coarse grained, with coarse gravel, trace medium grained, lose, orange-tan, saturated	743.15
25		
30	SM-SAND, fine grained, with silt, loose, gray, saturated	733.45
	SW-SAND, medium grained, with coarse grained, trace fines, loose, gray, saturated	733.15
35	- increase in fine grained, no coarse grained at 35.0ft BGS	
	END OF BOREHOLE @ 37.0ft BGS	726.15
40		
45		
50		

MONITORING WELL



WELL DETAILS
Screened interval:
731 15 to 726.15ft
32.00 to 37.00ft BGS
Length: 5ft
Diameter. 2in
Material: 2" Ø PVC Screen
Seal:
736.15 to 733.15ft
27.00 to 30.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
733.15 to 726.15ft
30.00 to 37.00ft BGS
Material: Sand WP01 (#6)

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO3
DATE COMPLETED: May 5, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352652.85
EASTING: 235969.84

TOP OF CASING 765.97
TOP OF RISER 765.65
GROUND SURFACE 763.00

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, with sand	762.00
2	ML-SANDY SILT, slight plasticity, soft, loose, *tan to light brown, slightly moist*	761.00
	SM-SAND, fine grained, with silt, loose, tan to light brown, slightly moist	
4		
	SP-SAND, medium grained, trace gravel, loose, dark orange-red (oxidation), slightly moist	758.20
6		
8		
10	- coarse grained, with gravel, saturated at 10.0ft BGS	
12		
14		
16		
18		
20	SW-SAND, coarse grained, with coarse gravel, trace medium grained, lose, orange-tan, saturated	743.00
22		
24		
26		
28		
30	SM-SAND, fine grained, with silt, loose, gray, saturated	733.30
	SW-SAND, medium grained, with coarse grained, trace fines, loose, gray, saturated	733.00
32		
34		

MONITORING WELL: BENTONITE/ CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE: NUMBER | INTERVAL | REC (%) | 'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO3
DATE COMPLETED: May 5, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
36	- increase in fine grained, no coarse grained at 35.0ft BGS						
38							
40	- coarse grained, trace gravel at 40.0ft BGS						
42							
44							
46	- 2' layer with gravel at 46.0ft BGS						
48	- medium and fine grained at 48.0ft BGS						
50	SP-SAND, fine, very loose, brown, saturated, poor recovery	713.00					
52							
54							
56							
58							
60	- 1' coarse grained at 60.0ft BGS						
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO3
DATE COMPLETED: May 5, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
72							
74							
76							
78							
80							
82			3/8" HOLE PLUG				
84							
86	CL-SILTY CLAY, firm, low plasticity, gray, moist, trace fine sand	677.00					
88			2" Ø PVC WELL SCREEN				
90	ML-SANDY SILT, loose, brown, saturated	673.00	SAND WP01 (#6)	1			
92	END OF BOREHOLE @ 92.0ft BGS	671.00					
94							
96							
98							
100							
102							
104							

WELL DETAILS
Screened interval:
676.00 to 671.00ft
87.00 to 92.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
682.00 to 679.00ft
81.00 to 84.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
679.00 to 671.00ft
84.00 to 92.00ft BGS
Material: Sand WP01 (#6)

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO4
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

NORTHING: 2352646.28
EASTING: 235971.31

	ELEV. ft
TOP OF CASING	765.60
TOP OF RISER	765.29
GROUND SURFACE	762.77

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft
0	TOPSOIL, with sand	761.77
2	ML-SANDY SILT, slight plasticity, soft, loose, tan to light brown, slightly moist	760.77
4	SM-SAND, fine grained, with silt, loose, tan to light brown, slightly moist	757.97
6	SP-SAND, medium grained, trace gravel, loose, dark orange-red (oxidation), slightly moist	
8		
10	- coarse grained, with gravel, saturated at 10.0ft BGS	
12		
14		
16		
18		
20	SW-SAND, coarse grained, with coarse gravel, trace medium grained, lose, orange-tan, saturated	742.77
22		
24		
26		
28		
30	SM-SAND, fine grained, with silt, loose, gray, saturated	733.07
32	SW-SAND, medium grained, with coarse grained, trace fines, loose, gray, saturated	732.77
34		
36	- increase in fine grained, no coarse grained at 35.0ft BGS	
38		

MONITORING WELL: BENTONITE/CONCRETE; BENTONITE GROUT; 2" Ø PVC WELL CASING; 8" Ø BOREHOLE

SAMPLE	NUMBER	INTERVAL	REC (%)	'N' VALUE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611-WIN-TSFRD TO M. HILVERDA 051010.GPJ CRA_CORP.GDT 10/14/10

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO4
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
42	- coarse grained, trace gravel at 40.0ft BGS						
44							
46	- 2' layer with gravel at 46.0ft BGS						
48	- medium and fine grained at 48.0ft BGS						
50	SP-SAND, fine, very loose, brown, saturated, poor recovery	712.77					
52							
54							
56							
58							
60	- 1' coarse grained at 60.0ft BGS						
62							
64							
66							
68							
70							
72							
74							
76							
78							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO4
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
82							
84							
86	CL-SILTY CLAY, firm, low plasticity, gray, moist, trace fine sand	676.77					
88							
90	ML-SANDY SILT, loose, brown, saturated	672.77					
92							
94	SM-SAND, fine grained, with silt, loose, brown, saturated	669.77					
96							
98	- silty, with clay at 98.0ft BGS						
100	CL-SILTY CLAY, firm, low plasticity, gray, moist	663.77					
102							
104	SP/ML-SILTY SAND, fine, loose/soft, brown, saturated	659.77					
106							
108							
110	SP/SM-SAND, fine, with silt, loose, brown ,saturated	652.77					
112							
114							
116							
118	- 1' silty at 118.0ft BGS						

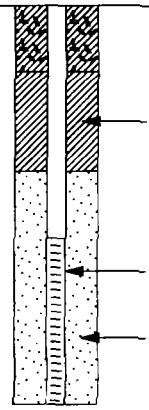
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: WTO4
DATE COMPLETED: May 4, 2010
DRILLING METHOD: HSA
FIELD PERSONNEL: T. PRANGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
122							
124							
126							
128							
130							
132	END OF BOREHOLE @ 132.0ft BGS	630.77					
134							
136							
138							
140							
142							
144							
146							
148							
150							
152							
154							
156							
158							



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WELL DETAILS
Screened interval:
635.77 to 630.77ft
127.00 to 132.00ft BGS
Length: 5ft
Diameter: 2in
Material: 2" Ø PVC Screen
Seal:
640.77 to 637.77ft
122.00 to 125.00ft BGS
Material: 3/8" Hole Plug
Sand Pack:
637.77 to 630.77ft
125.00 to 132.00ft BGS
Material: Sand WP01 (#6)

NOTES: *MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE*